DEPARTMENT OF THE AIR FORCE
Headquarters US Air Force
Washington DC 20330-1680

Air Force Job Qualification
Standard XXXXX-212N
XXXXX-212.14
2 February 2000

TACTICAL ANTENNAS

SECTION A: GENERAL

1. This Air Force Job Qualification Standard (AFJQS) and attached Air Force Qualification Training Package (AFQTP) standardize on-the-job training (OJT) tasks and constitute an approved training program for Tactical Antennas. The AFJQS and AFQTP are used by unit training managers, supervisors, trainers, trainees, and other training functions to plan, conduct, and document OJT on this equipment.

2. Maintain the AFJQS IAW AFI 36-2201, AFI 36-2233, and AFMAN 36-2247. Routine changes will be accomplished via page changes and urgent changes will be disseminated via message. Enter additional local tasks in the blank areas on the AFJQS or add forms. Develop Task Training Guides for added tasks; they should be consistent in content and format with those in the AFQTP. Submit recommended AFJQS/AFQTP improvements/corrections to the 81 TRSS Qualification Training Flight (81 TRSS/TSQS, 601 D Street, Keesler AFB MS 39534-2229).

3. Review Air Force publishing bulletins and AFIND8 to identify available training materials. Use this AFJQS in conjunction with other applicable JQSs or the Career Field Education and Training Plan (CFETP) and locally assigned tasks to identify work center duty positions. Also, use this AFJQS along with other applicable JQSs and the CFETP to evaluate newly assigned personnel and identify individual training requirements.

4. Tasks listed on the AFJQS have been selected IAW the Instructional System Development (ISD) process and are the minimum, mandatory AF training requirements for this equipment. The "X" code in the Core Task column of the AF Form 797 is used to indicate that the individual must be trained and certified on that particular task. The "X*" code identifies tasks that may not be common to all equipment, however, the task must be trained if it is assigned to the individual's duty position. The "—" code is used to indicate that training on this task is a local determination while ensuring 100 percent task coverage within the work center.

5. Trainees must accurately perform each assigned task unassisted IAW Technical References (TR) prior to being certified. To qualify for skill-level upgrade, trainees must be certified on assigned tasks, satisfactorily complete career knowledge training, and meet mandatory specialty qualifications IAW AFI 36-2101, AFI 36-2201, and AFMAN 36-2108. After upgrade, assign individuals to other work center duty positions and continue qualification training.

Supersedes AFJQS XXXXX-212N, dated 1 October 1999
OPR: HQ USAF/ILMM
OCR: 81 TRSS/TSQR
DISTRIBUTION: X

SECTION B: DOCUMENTATION

1. AFJQS/CFETP tasks will be compiled in an automated training management system, such as the Core Automated Maintenance System (CAMS), if available. The system must contain each AFJQS/CFETP title line with appropriate AFJQS/CFETP numbers, titles, and dates. AFJQS/CFETP and automated documentation requirements are listed below. The alphanumeric AFJQS number is converted to a dotted decimal number for use in CAMS. Alphanumeric numbers have been converted by retaining the 200 series number and changing the alpha character to the corresponding number, i.e., -200B becomes -200.2 and -201LB becomes -201.12.2.

a. Load applicable tasks in the automated training system or identify training requirements by circling the task numbers on each individual's AFJQS/CFETP.

b. If task statements contain more than one noun or action verb which precludes certification on the entire task, load/circle the noun or verb to indicate the individual is being trained only on that portion of the task.

c. When training is started on a task, enter the start date in the appropriate place. When training is complete, document training and task certification IAW local certification procedures.

2. The identification blocks listed below are to be used when the trainer is other than the trainee's immediate supervisor.

TRAINEE'S NAME:	INITIALS:	SSN:
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		
TRAINER'S NAME, INITIALS, DATE:		

BY ORDER OF THE SECRETARY OF THE AIR FORCE

OFFICIAL

JOHN W. HANDY, Lieutenant General, USAF
Deputy Chief of Staff/Installations and Logistics

4 Atch
1. AF Form 797
2. Trainer's Guide
3. Skill Training Material
4. Knowledge Evaluation Pamphlet

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
212.14.1 Erect Telescopic Mast TR: Field Antenna Handbook, sec III, and/or local directives	X*					
212.14.2 Erect AN/GRA-4 Mast TR: 31R2-2GRA-101 and/or local directives	X*					
212.14.3 DIPOLE/DOUBLET ANTENNA TR: Field Antenna Handbook and/or local directives						
212.14.3.1 Construct dipole/doublet antenna TR: Field Antenna Handbook, sec III	X*					
212.14.3.2 Troubleshoot dipole/doublet antenna TR: Field Antenna Handbook, sec V	X*					
212.14.4 FOLDED DIPOLE ANTENNA TR: B and W Model AC2-22 Antenna Manual and/or local directives						
212.14.4.1 Raise folded dipole antenna TR: B and W Model AC2-22 Antenna Manual and/or local directives	X*					
212.14.4.2 Troubleshoot folded dipole antenna TR: B and W Model AC2-22 Antenna Manual and/or local directives	—					
212.14.5 INVERTED "L" ANTENNA TR: Field Antenna Handbook and/or local directives						
212.14.5.1 Construct inverted "L" antenna TR: Field Antenna Handbook, sec III, and/or local directives	X*					

TRAINEE NAME *(Last, First, MI)*	CFETP/JQS NUMBER	PAGE NO
	XXXXX-212N	1

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
212.14.5.2 Troubleshoot inverted "L" antenna TR: Field Antenna Handbook, sec V, and/or local directives	—					
212.14.6 INVERTED VEE ANTENNA TR: Field Antenna Handbook and/or local directives						
212.14.6.1 Construct inverted vee antenna TR: Field Antenna Handbook, sec III, and/or local directives	X*					
212.14.6.2 Troubleshoot inverted vee antenna TR: Field Antenna Handbook, sec V, and/or local directives	—					
212.14.7 SLOPING LONG-WIRE ANTENNA TR: Field Antenna Handbook and/or local directives						
212.14.7.1 Construct sloping long-wire antenna TR: Field Antenna Handbook, sec III, and/or local directives	X*					
212.14.7.2 Troubleshoot sloping long-wire antenna TR: Field Antenna Handbook, sec V, and/or local directives	—					
212.14.8 MULTIFREQUENCY DOUBLET ANTENNA TR: Field Antenna Handbook and/or local directives						
212.14.8.1 Construct multifrequency doublet antenna TR: Field Antenna Handbook, sec III, and/or local directives	X*					
212.14.8.2 Troubleshoot multifrequency doublet antenna TR: Field Antenna Handbook, sec V, and/or local directives	—					

TRAINEE NAME *(Last, First, MI)*	CFETP/JQS NUMBER	PAGE NO
	XXXXX-212N	2

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
212.14.9 EYRING LOW PROFILE ANTENNA TR: Eyring Low Profile Antenna Training Manual and/or local directives						
212.14.9.1 Construct eyring low profile antenna TR: Eyring Low Profile Antenna Training Manual and/or local directives	X*					
212.14.9.2 Troubleshoot eyring low profile antenna TR: Eyring Low Profile Antenna Training Manual and/or local directives	—					
212.14.10 AS-2259 ANTENNA TR: AS-2259 Antenna Instructions and/or local directives						
212.14.10.1 Construct AS-2259 antenna TR: AS-2259 Antenna Instructions and/or local directives	X*					
212.14.10.2 Troubleshoot AS-2259 antenna TR: AS-2259 Antenna Instructions and/or local directives	—					
212.14.11 DC-80 ANTENNA TR: DHV Technical Manual and/or local directives						
212.14.11.1 Construct DC-80 antenna TR: DHV Technical Manual and/or local directives	X*					
212.14.11.2 Troubleshoot DC-80 antenna TR: DHV Technical Manual and/or local directives	—					
212.14.12 OE-354/GRC ANTENNA TR: OE-254/GRC Technical Manual and/or local directives						

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
212.14.12.1 Construct OE-254/GRC antenna TR: OE-254/GRC Technical Manual and/or local directives	X*					
212.14.12.2 Troubleshoot OE-254/GRC antenna TR: OE-254/GRC Technical Manual and/or local directives	—					
212.14.13 AT-1097 DISCONE ANTENNA TR: AT-1097 Manufacturer's Manual and/or local directives						
212.14.13.1 Construct AT-1097 discone antenna TR: AT-1097 Manufacturer's Manual and/or local directives	X*					
212.14.13.2 Troubleshoot AT-1097 discone antenna TR: AT-1097 Manufacturer's Manual and/or local directives	—					
212.14.14 DM C120/TRIVEC ANTENNA TR: DM C120 Technical Manual; AV-2040 Operator's Manual, and/or local directives						
212.14.14.1 Set up DM C120/TRIVEC antenna TR: DM C120 Technical Manual; AV-2040 Operator's Manual, and/or local directives	X*					
212.14.14.2 Troubleshoot DM C120/TRIVEC antenna TR: DM C120 Technical Manual; AV-2040 Operator's Manual, and/or local directives	—					
212.14.15 DM C121 ANTENNA TR: DM C121 Technical Manual and/or Local directives						
212.14.15.1 Set up DM C121 antenna TR: DM C121 Technical Manual and/or local directives	X*					

JOB QUALIFICATION STANDARD CONTINUATION/COMMAND JQS

TASKS, KNOWLEDGE, AND TECHNICAL REFERENCES	CORE TASK	CERTIFICATION				
		START DATE	COMPLETE DATE	TRAINEE'S INITIALS	TRAINER'S INITIALS	CERTIFYING OFFICIAL'S INITIALS
212.14.15.2 Troubleshoot DM C121 antenna TR: DM C121 Technical Manual and/or local directives	—					
212.14.16 DM C122 ANTENNA TR: DM C122 Technical Manual and/or local directives						
212.14.16.1 Set up DM C122 antenna TR: DM C122 Technical Manual and/or local directives	X*					
212.14.16.2 Troubleshoot DM C122 antenna TR: DM C122 Technical Manual and/or local directives	—					
212.14.17 DM C152 ANTENNA TR: DM C152 Technical Manual and/or local directives						
212.14.17.1 Set up DM C152 antenna TR: DM C152 Technical Manual and/or local directives	X*					
212.14.17.2 Troubleshoot DM C152 antenna TR: DM C152 Technical Manual and/or local directives	—					

AIR FORCE QUALIFICATION TRAINING PACKAGE XXXXX-212N

PART OF AFJQS XXXXX-212N

TACTICAL ANTENNAS

TRAINER'S GUIDE

2 FEBRUARY 2000
SUPERSEDES AFJQS XXXXX-212N
DATED 1 OCTOBER 1999

FOR OJT USE ONLY

TRAINER'S GUIDE

CONTENTS

ABOUT THIS TRAINING PACKAGE

This training package was developed by SSgt. Ronald E. Maples and revised by MSgt Ronald E. Dupree, 81 TRSS Qualification Training Flight, Keesler AFB, MS. The Training and Education Specialist was MSgt William Bowman. MSgt Rollin M. Calhoun, 2 CCS, Barksdale AFB, LA; SSgt Jerry B. Edwards, HQ AFSOC, Hurlburt Field, FL; and SSgt Terrell Thomas, 12 CCS, Davis-Monthan AFB, AZ, supported the development as tactical antenna subject matter experts. It was field tested and validated at HQ ACC, HQ AFSOC, 2 CSS, and 12 CSS.

For more information on the 81 TRSS Qualification Training Flight and a list of other products that are available, feel free to visit our home page at http://www.keesler.af.mil/81trss/qflight.

IMPORTANT INFORMATION

The following training guidance is intended for use by qualified trainers. It is mandatory that trainers complete Air Force Training Course J6AJI3S251-000 before attempting to train anyone on this material. Contact your unit training manager to obtain training on this course.

This training package was developed with four objectives in mind.

- Standardize on-the-job training.
- Reduce training time while maintaining proficiency standards.
- Provide trainers and trainees with a logically organized training plan which yields immediate and measurable feedback.
- Provide a standard to measure task knowledge and performance during personnel evaluations.

HOW TO USE THIS TRAINING PACKAGE

PACKAGE DESCRIPTION

This training package consists of

- an AF Form 797 that lists all tasks performed during development of OJT material that require structured training and certification.
- a Trainer's Guide that provides the trainer with instructions on how to effectively conduct on-the-job training using this training package. The Trainer's Guide includes Task Training Guides (TTG) and covers every task listed on the AF Form 797. The task evaluation checklists reflect the major areas of a task which must be performed satisfactorily before certification. A Training Completion Certification is attached.

- Skill Training Material (STM) which contains training modules, review questions, performance procedures, and a review question confirmation key.
- a Knowledge Evaluation Pamphlet (KEP) which contains a test for each module. Keep the pamphlet separate until you are ready to administer the tests. Detach and store the KEP Key and Answer Sheet(s) in a secure place to ensure the KEP is not compromised.

INSTRUCTIONS FOR USING THIS TRAINING PACKAGE

- Review the trainee's training record (AF Form 623) and determine the trainee's previous training and certification.
- Assign the trainee to a duty position and develop the trainee's individual training plan (ITP) (see Figure 1 for an example of a computer-generated plan). Using the ITP, select the first task for training and review the applicable TTG.
- Ensure all training references are available and all prerequisites for that task are met.
- Discuss with trainee the task objective(s) and training steps. Assign corresponding STM module for the trainee to complete.
- When you are satisfied with the trainee's knowledge of the material, administer the KEP. (Normally, the trainee is NOT permitted to use TRs but if TR use is permitted, it will be stated at the beginning of each KEP test and a score of 100 percent required. Otherwise, the trainee must score a minimum of 70 percent on the KEP tests.) Check the trainee's answers against the KEP Confirmation Key and review missed questions with trainee to ensure understanding of the material. If the score is less than what is required, have the trainee restudy the module and retake the test. Using TRs and the Task Evaluation Checklist as guidance, explain the task performance procedures to the trainee. Demonstrate the task procedures to the trainee and answer any questions. Have the trainee practice and explain the task procedures to you.
- Have the trainee perform the task procedures unassisted. Using the Task Evaluation Checklist, evaluate the trainee's performance. Should the trainee fail, determine the cause of unsatisfactory performance. Reevaluate the trainee when you are satisfied the task can be performed unassisted. When the trainee performs the task at the desired level of proficiency without assistance, document training and task certification IAW local certification procedures.
- Using the ITP, assign additional tasks until the trainee completes the requirements for the duty position. If, before completing this training package, the trainee is reassigned to another location which has a need for this training, we

recommend you forward the training material to the gaining work center.

- Schedule periodic evaluations after the trainee is task certified. You may use the performance procedures, task evaluation checklists, or the KEP.
- When training is completed, remove the attached Training Completion Certification and give it to the trainee so he/she may make recommendations, suggestions, or offer corrections to the training package in the comments section. Mail the completed Training Completion Certification to the address specified. Upon receipt of a properly completed training certification, a Certificate of Training will be forwarded through channels to the trainee.

INDIVIDUAL TRAINING PLAN

TRAINEE: Amn Smith TRAINER: SSgt Jones

AFJQS NUMBER/ TASK NUMBER	ESTIMATED TRAINING TIME	ESTIMATED START TIME	DATE TRAINING COMPLETED	REMARKS
XXXXX-XXXX /1	2 days	21 Jun 98	23 Jun 98	
/2	4 hours	24 Jun 98	25 Jun 98	

EXAMPLE **EXAMPLE**

This Individual Training Plan is an example only.
It does not reflect accurate training times.

Figure 1. Individual Training Plan

LIST OF TERMS

TERM	DEFINITION
EFU	Element Feed Unit
HF	High Frequency
LOS	Line of Sight
NVIS	Near Vertical Incident Sky-wave
OI	Operating Instruction
PDU	Power Divider Unit
RF	Radio Frequency
SATCOM	Satellite Communications
UHF	Ultra High Frequency
VHF	Very High Frequency

TELESCOPIC MAST ERECTION
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.1

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Field Antenna Handbook
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.

TRAINING OBJECTIVE(S)

- Given the Field Antenna Handbook, local directives, a carrymast-15H component bag, safety equipment, and applicable tools, erect Telescopic mast IAW sec III in the Handbook and prescribed procedures.

INITIAL TRAINING STEPS (CHECK WHEN COMPLETED)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

Assign AFQTP Module 1.

Discuss the review questions and answers with the trainee.

Administer the KEP.

Check the KEP answers and review missed questions.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Discuss with trainee the required area needed to build the mast. Include placement of base plate.

Demonstrate how the measuring rope is used to get distances for stakes. Include the proper way to drive stakes into ground.

Demonstrate to the trainee how to set the mast into the base plate.

Demonstrate how to attach the lower guy ropes to the lower guy plate and stakes.

Demonstrate how to level the mast by tightening lower guy ropes until the bubble is in the center of black circle.

Demonstrate how to attach top guy ropes and halyard to top guy plate and stakes.

Demonstrate how to raise top mast section by releasing tension latch, pushing up mast section, and locking tension latch. Explain that this procedure has to be repeated two more times **before continuing.**

Demonstrate how to attach middle guy ropes to middle guy plate and stakes.

Demonstrate how to raise bottom mast section by releasing tension latch, pushing up mast section, and locking tension latch. Explain that this procedure has to be repeated three more times **before continuing.**

Demonstrate how to insert the locking pin in lower guy plate.

Demonstrate how to get mast as vertical as possible by tightening and/or loosening guy ropes.

Demonstrate where to post safety signs around mast.

Demonstrate how to lower mast.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Selected area for mast construction.

Positioned base plate in center of construction area.

Measured distances needed for stakes.

Connected mast section into base plate.

Attached lower guy ropes to lower guy plate and stakes.

Leveled mast section using bubble indicator.

Attached top guy ropes and halyard to top guy plate and stakes.

Raised top mast section.

Attached middle guy ropes to middle guy plate and stakes.

Raised bottom mast section.

Installed locking pin.

Tightened all guy ropes.

Posted safety signs.

Lowered mast.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign next task for training.

AN/GRA-4 MAST ERECTION TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- TO 31R2-2GRA-101
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- Given TO 31R2-2GRA-101, local directives, an AN/GRA-4 mast kit, safety equipment, and applicable tools, erect an AN/GRA-4 Mast IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure

all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Discuss with trainee the required area needed to build the mast. Include placement of base plate.

Demonstrate how to drive swivel stakes through the base plate.

Demonstrate how to connect the whip insulator to swivel. Explain the purpose of the whip insulator.

Demonstrate how to assemble five lower and five middle mast sections to the whip adapter. Explain proper alignment of guy plate holes.

Demonstrate how to use the assembled lower and upper mast sections to position guy stakes. Include the proper way to drive stakes into ground.

Demonstrate how to assemble the remaining mast sections. Again, explain proper alignment of guy plate holes.

Demonstrate how to attach the whip adapter to top of mast. Explain the purpose of the whip adapter.

Discuss briefly the procedures for connecting back guy ropes. Explain why the back guy ropes are done first.

Demonstrate how to measure 52-foot guy rope from top guy plate out to side stake and then attach to back stake.

Demonstrate how to measure 42-foot guy rope from middle guy plate out to side stake and then attach to back stake.

Demonstrate how to measure 33-foot guy rope from lower guy plate out to side stake and then attach to back stake.

Discuss briefly the procedures for connecting side guy ropes. Explain that the procedures are the same for both sides.

Demonstrate how to attach and tighten 52-foot guy ropes to top guy plate and side stakes.

Demonstrate how to attach and tighten 42-foot guy ropes to middle guy plate and side stakes.

Demonstrate how to attach and tighten 33-foot guy ropes to lower guy plate and side stakes.

Discuss briefly the procedures for connecting front guy ropes. Include connection of the halyard.

Demonstrate how to attach the 52-foot guy rope to top guy plate and lay out towards remaining stake.

Demonstrate how to attach 42-foot guy rope to middle guy plate and lay out towards remaining stake.

Demonstrate how to attach 33-foot guy rope to lower guy plate and lay out towards remaining stake.

Demonstrate how to attach halyard onto top guy plate and lay out towards remaining stake.

Discuss the procedures for lifting mast.

Demonstrate how to lift mast.

Demonstrate how to secure remaining guy ropes. Explain that the person that pushed the mast up holds it in place until the remaining guy ropes are secure.

Demonstrate how to adjust mast as vertical as possible by loosening and/or tightening guy ropes. Explain that some bowing will occur.

Demonstrate where to post safety signs around mast.

Discuss the procedures for lowering the mast.

Demonstrate how to disconnect guy ropes that will be used to lower the mast. Explain that only the 52-foot and 42-foot guy ropes need to be held and that the others can fall toward the mast.

Demonstrate how to start the mast rocking by pulling slightly on the guy ropes.

Demonstrate how to walk the mast down before dropping. Explain that this procedure differs according to the strength of the person lowering the mast.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.2 EVALUATION

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Selected area for construction.

Positioned base plate in center of construction area.

Hammered down swivel stake through base plate.

Installed whip insulator.

Assembled five lower and five middle mast sections onto whip adapter.

Aligned guy plate holes.

Positioned stakes using assembled mast sections.

Assembled remaining mast sections together.

Aligned guy plate holes.

Attached whip adapter to top of mast.

Measured 52-foot guy rope from top guy plate out to side stake and then attached to back stake.

Measured 42-foot guy rope from middle guy plate out to side stake and then attached to back stake.

Measured 33-foot guy rope from lower guy plate out to side stake and then attached to back stake.

Attached 52-foot guy ropes to top guy plate and side stakes and then tightened.

Attached 42-foot guy ropes to middle guy plate and side stakes and then tightened.

Attached 33-foot guy ropes to lower guy plate and side stakes and then tightened.

Repeated steps (14) through (16) for opposite side.

Attached 52-foot guy rope to top guy plate and laid out towards remaining stake.

Attached 42-foot guy rope to middle guy plate and laid out towards remaining stake.

Attached 33-foot guy rope to lower guy plate and laid out towards remaining stake.

Attached halyard to top guy plate and laid out towards remaining stake.

Pushed or pulled up mast.

Attached remaining guy ropes to stake.

Tightened all guy ropes as needed.

Posted safety signs.

Lowered mast.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

DIPOLE/DOUBLET ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.3.1
- 212.14.3.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Field Antenna Handbook, Section III
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the Field Antenna Handbook, two AN/GRA-4 or Telescopic masts, Dipole/Doublet Antenna kit, safety equipment, and applicable tools, construct Dipole/Doublet antenna IAW sec III.

- OBJECTIVE 2: Given the Field Antenna Handbook, a constructed Dipole/Doublet Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot Dipole/Doublet Antenna IAW sec V.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

For training purposes, the balun will be used for constructing the antenna. Show and explain to the trainee what a cobrahead and antenna coupler look like, and when and where they would be used.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building masts and selecting antenna.

Demonstrate how to calculate the antenna for size using the half-wave formula: Dipole length in feet = 468 divided by frequency in MHz divided by 2.

Discuss with trainee the area needed for construction of antenna. Explain to trainee that distance between masts should be one-half wavelength of measured antenna plus 10 feet. At this time, construct the masts.

Demonstrate how to connect one end of each antenna element to halyards. Include how to "bug- nut" end of wire and insulate, if antenna reel is <u>not</u> used. Explain the purpose of the insulators.

Demonstrate how to connect other ends of antenna elements to balun. Explain the purpose of the balun.

Demonstrate how to connect coaxial cable to balun.

Demonstrate how to raise antenna by pulling on halyards. Include how to tie halyards to bottom of masts.

Demonstrate how to remove sag in antenna and inward bowing of masts by tightening guy ropes. Explain why it is necessary to keep the antenna as horizontal as possible.

Demonstrate how to keep the coaxial cable as perpendicular with the ground as possible by staking down. Explain why this is done.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.3.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Measured antenna length using half-wave formula.

Selected area for construction.

Connected one end of each antenna element to halyards.

Connected other end of antenna elements to balun.

Connected coaxial cable to balun.

Raised antenna by pulling on halyards.

Removed sag in antenna by tightening guy ropes on masts.

Staked down coaxial cable.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take when troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter power entry panel, if using generator power.

Demonstrate how to check the power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that antenna elements and coaxial cable are connected properly at balun.

Demonstrate how to check insulators on antenna, if used.

Demonstrate how to check antenna to determine if length is correct. Explain that this will not be done if antenna coupler is used.

Discuss with trainee how to determine if the broadside of the antenna is facing the distant station correctly using applicable chart(s), or road map(s), and compass.

Discuss with trainee if the antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.3.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that antenna elements and coaxial cable were connected properly at balun.

Checked insulators on antenna, if used.

Checked antenna length.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), and compass.

Determined the ability of the antenna to operate over required distance and path using antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

FOLDED DIPOLE ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.4.1
- 212.14.4.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- B and W Model AC2-22 Antenna Manual
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the B and W Model AC2-22 Antenna Manual, local directives, two AN/GRA-4 or Telescopic masts, Folded Dipole Antenna kit, safety equipment, and applicable tools, raise Folded Dipole Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the B and W Model AC2-22 Antenna Manual, local directives, a raised Folded Dipole Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot Folded Dipole Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

The Folded Dipole Antenna can be used in three different configurations: Inverted Vee Antenna, Sloping, and Dipole. Demonstrate each of these configurations and remind trainee that certification is given on this task after all these configurations are completed.

Inverted Vee Antenna Configuration

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building mast and selecting antenna.

Discuss with trainee the area needed for construction of antenna. At this time, construct the mast.

Demonstrate how to uncoil the antenna. Explain to trainee to keep the antenna tight during uncoiling to avoid twisting and kinking.

Demonstrate how to connect ropes to the sides of the antenna. Explain why it is best to keep the ropes shorter at the top than the bottom.

Demonstrate how to connect rope around balancing network to halyard. Explain the purpose of the balancing network.

NOTE

Before antenna is raised, make sure the condensation drain is located on the bottom of the balancing network.

Demonstrate how to connect coaxial cable to balun. Explain the purpose of the balun.

Demonstrate how to raise antenna by pulling on halyard. Include how to tie halyard to bottom of mast.

Demonstrate how to tie coaxial cable to bottom of mast using excess halyard rope.

Demonstrate how to connect the ends of the antenna to stakes. Explain that the elements are pulled as tight as possible.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages. Explain that if a more directional pattern is required, close the apex angle towards the distant station, changing the antenna to resemble a Sloping Vee Antenna.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Sloping Antenna Configuration

NOTE

For training purposes, the mast used for the Inverted Vee can be used.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before constructing antenna.

Discuss with trainee the area needed for construction.

Demonstrate how to connect one end of the antenna to halyard.

NOTE

Before antenna is raised, make sure the condensation drain is located on the bottom of the balancing network.

Demonstrate how to connect coaxial cable to balun.

Demonstrate how to raise antenna by pulling on halyard. Include how to tie halyard to bottom of mast.

Demonstrate how to stake down other end of antenna.

Demonstrate how to stake down coaxial cable.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for the lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Dipole Antenna Configuration

NOTE

For training purposes, the mast used for the Sloping Antenna can be used.

Demonstrate how to determine bearing for distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building another mast and selecting antenna.

Discuss with trainee the area needed for construction. Explain to trainee that distance between masts should be the size of antenna plus 10 feet. At this time, construct other mast.

Demonstrate how to connect ends of antenna to halyard.

NOTE

Before antenna is raised, make sure the condensation drain is located on the bottom of the balancing network.

Demonstrate how to connect coaxial cable to balun.

Demonstrate how to raise antenna by pulling on halyards. Include how to tie halyards to bottom of masts.

Demonstrate how to remove sag in antenna and inward bowing of masts by tightening guy ropes. Explain why it is important to keep the antenna as horizontal as possible.

Demonstrate how to keep the coaxial cable as perpendicular with the earth as possible by staking down. Explain why this is done.

Demonstrate where to post safety signs.

Demonstrate how to connect the coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.4.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Inverted Vee Antenna Configuration

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Selected area for construction.

Connected rope to sides of antenna.

Connected rope around balancing network.

Connected antenna rope to halyard.

Checked that condensation drain on balancing network was on the bottom.

Connected coaxial cable to balun.

Raised antenna by pulling on halyard.

Tied coaxial cable to bottom of mast using excess halyard rope.

Staked down antenna ends.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Sloping Antenna Configuration

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Selected area for construction.

Connected one end of antenna to halyard.

Checked that condensation drain on balancing network was on bottom.

Connected coaxial cable to balun.

Raised antenna by pulling on halyard.

Staked down other end of antenna.

Staked down coaxial cable.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Dipole Antenna Configuration

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Selected area for construction.

Connected ends of antenna to halyards.

Checked that condensation drain on balancing network was on bottom.

Connected coaxial cable to balun.

Raised antenna by pulling on halyard.

Removed sag in antenna by tightening guy ropes on masts.

Staked down coaxial cable.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

The following steps will be done for all three Folded Dipole Antenna configurations.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that this is the first step to take when troubleshooting.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter power entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that the coaxial cable is connected properly at balun.

Demonstrate how to check insulators on antenna, if used.

Discuss with trainee how to determine if the antenna is facing the distant station correctly using applicable chart(s), or road map(s), and compass.

Discuss with trainee how to determine if the antenna selected will operate over required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.4.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly at balun.

Checked insulators on antenna, if used.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), and compass.

Determined the ability of the antenna to operate over required distance and path using antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

INVERTED "L" ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.5.1
- 212.14.5.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Field Antenna Handbook, Section III
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the Field Antenna Handbook, local directives, two AN/GRA-4 or Telescopic masts, Inverted "L" Antenna kit, safety equipment, and applicable tools, construct Inverted "L" Antenna IAW sec III in the Handbook and prescribed procedures.

- OBJECTIVE 2: Given the Field Antenna Handbook, local directives, a constructed Inverted "L" Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot Inverted "L" Antenna IAW sec V in the Handbook and prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving the objective with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

For training purposes, the vertical element will be connected directly to the radio. Show and explain to the trainee what an antenna coupler looks like and when and where it would be used.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building mast and selecting antenna.

Discuss with trainee how to measure length of antenna for required frequency. Explain the frequency selected is the determining factor in length of the antenna.

Discuss with trainee the area needed for construction of antenna. Explain to trainee that distance between masts should be length of horizontal element plus 10 feet. At this time, construct the masts.

Demonstrate how to connect insulator on halyard. Explain the purpose of the insulator.

Demonstrate how to slide antenna wire through insulator and roll wire out towards other mast. Ensure trainee leaves enough antenna wire for vertical element to reach the radio.

Demonstrate how to connect antenna wire to halyard. Include how to "bug nut" and insulate end of antenna wire, if antenna reel is not used.

Demonstrate how to raise antenna by pulling on halyards. Explain that trainee must watch for tangles in the vertical element when raising. Include how to tie halyards to bottom of masts.

Demonstrate how to remove sag in antenna and inward bowing of masts by tightening guy ropes.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect antenna wire to radio.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.5.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Measured antenna for required frequency.

Selected area for construction.

Connected insulator to halyard.

Rolled out antenna wire and slid through insulator.

Connected antenna wire to halyard.

Raised antenna by pulling on halyards.

Removed sag in antenna by tightening guy ropes on masts.

Posted safety signs around antenna area.

Connected antenna wire to radio equipment.

Disconnected antenna wire from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where On/Off switch is located on the radio equipment. Explain that this is the first step to take when troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check insulators on antenna, if used.

Demonstrate how to check antenna to determine if length is correct. Explain that this will not be done if antenna coupler is used.

Discuss with trainee how to determine if the broadside of the antenna is facing the distant station correctly using applicable chart(s), or road map(s), and compass.

Discuss with trainee how to determine if the antenna selected will operate over required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.5.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked insulators on antenna, if used.

Checked antenna length.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), and compass.

Determined the ability of the antenna to operate over required distant and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

INVERTED VEE ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.6.1
- 212.14.6.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Field Antenna Handbook, Section III
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the Field Antenna Handbook, local directives, AN/GRA-4 or Telescopic mast, Inverted Vee Antenna kit, safety equipment, and applicable tools, construct Inverted Vee Antenna IAW sec III in the Handbook and prescribed procedures.

- OBJECTIVE 2: Given the Field Antenna Handbook, local directives, AN/GRA-4 or Telescopic mast, Inverted Vee Antenna kit, safety equipment, and applicable tools, troubleshoot Inverted Vee Antenna IAW sec V in the Handbook and prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

For training purposes, the balun will be used for constructing the antenna. Show and explain to the trainee what a cobrahead and antenna coupler look like, and when and where they would be used.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building mast and selecting antenna.

Demonstrate how to calculate the antenna for size, in feet, using the half-wave formula: 468 divided by frequency in MHz divided by 2.

Discuss with trainee the area needed for construction of antenna. At this time, construct mast.

Demonstrate how to connect one end of each antenna element to balun. Explain the purpose of the balun.

Demonstrate how to connect balun to halyard.

Demonstrate how to connect coaxial cable to balun.

Demonstrate how to raise antenna by pulling on halyard. Include how to tie halyard to bottom of mast.

Demonstrate how to tie coaxial cable to bottom of mast using excess halyard rope.

Demonstrate how to connect the other ends of the antenna elements to stakes. Include how to "bug-nut" end of wire and insulate, if antenna reel is not used. Explain the purpose of the insulator. Explain that the elements should be pulled as tight as possible before staking down.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages. Explain that if a more directional pattern is required, close the apex angle towards the distant station, which changes the antenna to resemble a Sloping Vee Antenna.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.6.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Measured antenna length using half-wave formula.

Selected area for construction.

Connected one end of antenna elements to balun.

Connected balun to halyard.

Connected coaxial cable to balun.

Raised antenna by pulling on halyards.

Tied coaxial cable to bottom of mast using excess halyard rope.

Staked down antenna ends.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Demonstrate where On/Off switch is located on the radio equipment. Explain that this is the first step to take when troubleshooting.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter power entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that antenna elements and coaxial cable are connected properly at balun.

Demonstrate how to check insulators, if used.

Demonstrate how to check antenna to determine if length is correct. Explain that this will not be done if antenna coupler is used.

Discuss with trainee how to determine if the antenna is facing the distant station correctly using applicable chart(s), or road map(s), and compass.

Discuss with trainee how to determine if the antenna selected will operate over required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.6.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that antenna elements and coaxial cable were connected properly at balun.

Checked insulators on antenna, if used.

Checked antenna length.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), and compass.

Determined the ability of the antenna to operate over required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

SLOPING LONG-WIRE ANTENNA TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.7.1
- 212.14.7.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Field Antenna Handbook, Section III
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the Field Antenna Handbook, local directives, AN/GRA-4 or Telescopic mast, Sloping Long-Wire Antenna kit, safety equipment, and applicable tools, construct Sloping Long-Wire Antenna IAW sec III in the Handbook and prescribed procedures.

- OBJECTIVE 2: Given the Field Antenna Handbook, local directives, a constructed Sloping Long-Wire Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot Sloping Long-Wire Antenna IAW sec V in the Handbook and prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

For training purposes, the antenna will not be terminated. Show and explain to the trainee what a terminating resistor, antenna coupler, and cobrahead look like and when and where they would be used.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building mast and selecting antenna.

Demonstrate how to determine the size of the antenna. Explain that the recommended length is 250-500 feet (the longer the antenna, the better the gain).

Discuss with trainee the area needed for construction of antenna. At this time, construct the mast.

Demonstrate how to connect one end of the antenna wire to halyard. Include how to "bug-nut" end of wire and insulate, if antenna reel is <u>not</u> used. Explain the purpose of the insulator.

Demonstrate how to roll other end of antenna wire out towards distant station.

Demonstrate how to raise antenna by pulling on halyard. Include how to tie to bottom of mast.

NOTE

For training purposes, the low end will be elevated using two AN/GRA-4 mast sections, guy plate, and one side

of mast kit. Pre-fabricated poles can be used, if available.

Demonstrate how to connect two guy ropes to guy plate and stake down 10 feet behind mast sections.

Demonstrate how to connect the end of the antenna wire to a balun. Explain the purpose of the balun.

Demonstrate how to connect a guy rope from the guy plate to balun. Include how to insulate, if needed.

Demonstrate how to connect coaxial cable to balun.

Demonstrate how to remove sag in antenna and inward bowing of mast by tightening guy ropes on mast and low end of antenna.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.7.1 EVALUATION

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Measured antenna for desired length.

Selected area for construction.

Connected one end of antenna wire to halyard.

Rolled out antenna wire.

Raised antenna by pulling on halyard.

Assembled mast sections for low end.

Connected and staked two guy ropes from guy plate on mast sections.

Connected end of antenna wire to balun.

Connected a guy rope from the guy plate to the balun.

Connected coaxial cable to balun.

Removed sag in antenna by tightening guy ropes on mast and low end of antenna.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Demonstrate where On/Off switch is located on the radio equipment. Explain that this is the first step to take when troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that coaxial cable and antenna wire are connected properly at balun.

Demonstrate how to check insulators on antenna, if used.

Demonstrate how to check antenna to determine if length is correct. Explain that this will not be done if antenna coupler is used.

Discuss with trainee how to determine if the antenna is facing the distant station correctly using applicable chart(s), or road map(s), and compass. The low end of antenna should be pointed 10 to 15 degrees right or left of distant station.

Discuss with trainee how to determine if the antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.2 EVALUATION:

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to Objective 2 if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable and antenna wire were connected properly at balun.

Checked insulators on antenna, if used.

Checked antenna length.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), and compass.

Determined the ability of the antenna to operate over required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

MULTIFREQUENCY DOUBLET ANTENNA TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.8.1
- 212.14.8.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Field Antenna Handbook, Section III
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the Field Antenna Handbook, local directives, two AN/GRA-4 or Telescopic masts, Multifrequency Doublet Antenna kit, safety equipment, and applicable tools, construct Multifrequency Doublet Antenna IAW sec III in the Handbook and prescribed procedures.

- OBJECTIVE 2: Given the Field Antenna Handbook, local directives, a constructed Multifrequency Doublet Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot Multifrequency Doublet Antenna IAW sec V in the Handbook and prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed..

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building masts and selecting antenna.

Demonstrate how to calculate the antenna for size using the half-wave formula: Dipole length, in feet, = 468 divided by frequency in MHz divided by 2. Explain that this formula will be used three times for three different frequencies.

Discuss with trainee the area needed for construction of antenna. Explain that distance between masts should be one-half wavelength of longest measured antenna plus 10 feet. At this time, construct the masts. Also, ensure that guy plates and halyards are placed on the two mast sections below the top guy plate.

Demonstrate how to connect one end on each of the longest antenna elements to top halyards. Include how to "bug-nut" end of wire and insulate, if antenna is not used. Explain the purpose of the insulator.

Demonstrate how to connect the other ends of the longest antenna elements to balun.

Demonstrate how to connect one end of each of the medium sized antenna elements to middle halyards.

Demonstrate how to connect the other ends of the medium sized antenna elements to balun.

Demonstrate how to connect one end of each of the shortest antenna elements to bottom halyards.

Demonstrate how to connect the other ends of the shortest antenna elements to balun.

Demonstrate how to connect coaxial cable to balun.

Demonstrate how to raise longest antenna elements by pulling top halyards. Include how to tie halyards to bottom of masts.

Demonstrate how to raise medium sized antenna elements by pulling middle halyards.

Demonstrate how to raise shortest antenna elements by pulling bottom halyards.

Demonstrate how to remove sag in antenna and inward bowing of masts by tightening guy ropes. Explain why it is necessary to keep the antenna as horizontal as possible.

Demonstrate how to keep the coaxial cable as perpendicular with the ground as possible by staking down. Explain why this is done.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.8.1 EVALUATION

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Measured antenna lengths using half-wave formula.

Selected area for construction.

Added extra guy plates to masts.

Connected longest antenna elements to top halyards and balun.

Connected medium sized antenna elements to middle halyards and balun.

Connected shortest antenna elements to bottom halyards and balun.

Connected coaxial cable to balun.

Raised antenna by pulling on halyards.

Removed sag in antenna by tightening guy ropes on masts.

Staked down coaxial cable.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take when troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that antenna elements and coaxial cable are connected properly at balun.

Demonstrate how to check insulators on antenna, if used.

Demonstrate how to check antenna to determine if lengths are correct.

Discuss with trainee how to determine if the antenna is facing the distant station correctly using applicable chart(s), or road map(s), and compass.

Discuss with trainee how to determine if the antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.8 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that antenna elements and coaxial cables were connected properly at balun.

Checked insulators on antenna, if used.

Checked length of antenna elements.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), and compass.

Determined the ability of the antenna to operate over required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

EYRING LOW PROFILE ANTENNA TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.9.1
- 212.14.9.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- Eyring Low Profile Antenna Training Manual
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the Eyring Low Profile Training Manual, local directives, an Eyring Low Profile Antenna kit, safety equipment, and applicable tools, construct Eyring Low Profile Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the Eyring Low Profile Training Manual, local directives, a constructed Eyring Low Profile Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot Eyring Low Profile Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

NOTE

For training purposes, the four-element antenna will be constructed.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building and selecting antenna.

Discuss with trainee the area needed for construction of antenna. Explain that the area will depend on how many elements are to be used. Include placement of two-way splitter in center of deployment area.

Demonstrate how to connect two 20-foot coaxial cables to two-way splitter and roll cables out perpendicular to the distant station.

Demonstrate how to take two PDUs and completely unreel the 10-foot coaxial cables.

Demonstrate how to connect the 20-foot coaxial cables from the two-way splitter to the type "N" RF-connector labeled XCVR on the hub of the PDUs. Ensure the 10-foot cables from the PDUs are parallel to the 20-foot cables.

Demonstrate how to connect one EFU to the end of each PDU 10-foot coaxial cable. Explain that the arrows on top of all EFUs must be pointed in the direction of the distant station.

Demonstrate how to take four of the stakes and place in the holes on side of the EFU. Repeat this for the other three EFUs.

Demonstrate how to take one of the antenna reels and connect looped end to EFU and roll out 75 feet. Seventy-five feet is the third insulator on antenna reel.

Demonstrate how to take the third insulator back to the EFU, disconnect looped end, and connect third insulator.

Demonstrate how to deploy looped end and antenna reel at full length to form a "V" with the apex of the EFU. Explain that for best results, the end of the "V" should be 6-feet wide. Explain that this procedure has to be repeated seven more times **before continuing**.

Demonstrate how to raise antenna off the ground by placing stakes at each insulator on antenna. Explain that the antenna is still operational without staking up the elements; however, the gain is reduced.

Demonstrate how to connect coaxial cable to the type "N" RF-connector on the two-way splitter. Explain that the radio equipment can be located in any convenient location; however, the coaxial cable must lie along the same line as the other coaxial cables.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to disassemble antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.9.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined the bearing of distant station using applicable chart(s), or road map(s), and compass

Determined area needed for construction of antenna.

Connected two 20-foot coaxial cables to two-way splitter and rolled cables out perpendicular to the distant station.

Took two PDUs and completely unreeled the 10-foot coaxial cables.

Connected the 20-foot coaxial cables from the two-way splitter to the type "N" RF-connector labeled XCVR on the hub of the PDUs.

Connected one EFU to the end of each PDU 10-foot coaxial cable.

Demonstrated how to take four of the stakes and place in the holes on side of the EFU. Repeated this for the other three EFUs.

Took one of the antenna reels and connected looped end to EFU and rolled out 75 feet.

Took the third insulator back to the EFU, disconnected looped end, and connected third insulator.

Deployed looped end and antenna reel at full length to form a "V" with the apex of the EFU. Repeated seven more times **before continuing**.

Raised antenna off the ground by placing stakes at each insulator on antenna.

Connected coaxial cable to the type "N" RF-connector on the two-way splitter.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Determined frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Disconnected antenna from radio equipment

Disassembled antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check the power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that coaxial cables are connected properly at the two-way splitter, EFUs, and PDUs.

Demonstrate how to check that antenna elements are connected properly at the EFUs.

Discuss with trainee how to determine if the antenna is facing distant station using applicable chart(s), or road map(s), and compass. Also, ensure the arrows on top of the EFUs are pointing towards the distant station.

Discuss with trainee how to determine if the antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.9.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cables were connected properly at two-way splitter, EFUs, and PDUs.

Checked that antenna elements were connected properly at EFUs.

Checked antenna bearing on distant station using applicable chart(s), or road map(s), compass and arrows on EFUs.

Determined the ability of the antenna to operate over required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

AS-2259 ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.10.1
- 212.14.10.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- AS-2259 Antenna Instructions
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given AS-2259 Antenna Instructions, local directives, an AS-2259 Antenna kit, safety equipment, and applicable tools, construct AS-2259 Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given AS-2259 Antenna Instructions, local directives, a constructed AS-2259 Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot AS-2259 Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate how to determine the bearing of distant station using applicable chart(s), or road map(s), and compass. Explain why this is important before building and selecting antenna.

Discuss with trainee the area needed for construction. Include placement of the base plate.

Demonstrate how to assemble the seven mast sections.

Demonstrate how to unroll the antenna elements from the top mast section and lay out towards area where stakes will go.

Demonstrate how to assemble top mast section to mast. Include tightening of screws on top mast section.

Demonstrate how to install mast section to base plate. Ensure antenna elements are going in the correct directions by looking where the antenna elements are connected to the top of the mast.

Demonstrate how to stake down antenna elements. Explain that the person placing the mast on the base plate holds the mast while another person goes around and stakes down the elements.

NOTE

The antenna elements should have a slight slack in them to help prevent the antenna from collapsing in bad weather.

Demonstrate, if needed, how to tighten the antenna elements by wrapping the rope on the end of the elements around the stakes.

Demonstrate how to connect coaxial cable to base plate.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.10.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined bearing of distant station using applicable chart(s), or road map(s), and compass.

Selected area for construction.

Assembled seven mast sections.

Unrolled antenna elements from top mast section and laid out towards area where stakes will go.

Connected top mast section to assembled mast.

Installed mast section to base plate.

Checked top of mast for correct direction of antenna elements.

Staked down antenna elements.

Connected coaxial cable to base plate.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that the coaxial cable is connected properly at base plate.

Demonstrate how to check that the antenna elements are pointing in the correct direction.

Discuss with trainee how to determine if the antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.10.2 EVALUATION:

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to objective 2 if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly at base plate.

Checked that antenna elements were pointing in the correct direction.

Determined the ability of the antenna to operate over required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

DC-80 ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.11.1
- 212.14.11.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- DHV Technical Manual
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the DHV Technical Manual, local directives, AN/GRA-4 or Telescopic mast, DC-80 system components, safety equipment, and applicable tools, construct DC-80 Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the DHV Technical Manual, local directives, a constructed DC-80 Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot DC-80 Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Discuss with trainee the area needed for construction. At this time, assemble the mast, but do not lift mast until antenna is constructed and connected to mast.

Demonstrate how to screw eight top element rods into disc.

Demonstrate how to screw eight bottom elements into hub.

Demonstrate how to torque all rods to approximately 200 inch-lbs.

Demonstrate how to connect the antenna onto a pole measuring 1-1/4" in diameter and at least 1 foot in length.

Demonstrate how to connect antenna to mast.

Demonstrate how to connect coaxial cable to antenna.

Demonstrate how to raise antenna by pulling up mast. Include how to tie coaxial cable to bottom of mast.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.11.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Selected area for construction.

Screwed eight top element rods into disc.

Screwed eight bottom element rods into disc.

Tightened all elements to approximately 200 inch-lbs.

Connected antenna onto a pole measuring 1-1/4" in diameter and at least 1 foot in length.

Connected antenna to mast.

Connected coaxial cable to antenna.

Raised antenna.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where On/Off switch is located on the radio equipment. Explain that this is the first step to take when troubleshooting.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that all top and bottom element rods are connected properly at the disc.

Demonstrate how to check that the coaxial cable is connected properly on the antenna.

Discuss with trainee how to determine if the antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.11.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that all top and bottom elements were connected properly at the disc.

Checked that coaxial cable was connected properly on antenna.

Determined the ability of the antenna to operate over required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OE-254/GRC ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.12.1
- 212.14.12.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- OE-254/GRC Technical Manual
- Local Directives
- AFQTP Module 1

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the OE-254/GRC Technical Manual, local directives, an OE-254/GRC Antenna kit, safety equipment, applicable tools, construct OE-254/GRC Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the OE-254/GRC Technical Manual, local directives, an OE-254/GRC Antenna kit, safety equipment, and applicable tools, troubleshoot OE-254/GRC Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Discuss with trainee the area needed for construction. Include placement of the base plate. Ensure the ribs on the base plate are pointing up.

Demonstrate how to drive the stake of the mast and base assembly through the center hole of the base plate.

Demonstrate how to place the four ground stakes 90 degrees away from each other by assembling five lower mast sections, the lower adapter assembly, and three upper mast sections to base plate and then rotating the mast on the ground.

Demonstrate how to place a guy plate on the male end of lower adapter assembly and connect adapter to assembled lower mast sections. Include proper alignment of guy plate holes.

Demonstrate how to assemble five upper mast sections and connect to lower mast section.

Demonstrate how to place a guy plate on the male end of upper adapter assembly and connect to the mast. Again, ensure proper alignment of guy plate holes.

Discuss briefly the procedures for connecting back guy ropes. Explain why the back guy ropes are done first.

Demonstrate how to measure the back guy ropes from the lower and upper guy plates out to side stake and then attach to back stake.

Discuss briefly the procedures for connecting side guy ropes. Explain that the procedures are the same for both sides.

Demonstrate how to attach side guy ropes to the lower and upper guy plates and side stakes and then tighten.

Discuss briefly the procedures for connecting front guy ropes.

Demonstrate how to attach front guy ropes to the lower and upper guy plates and lay out toward remaining stake.

NOTE

Each insulating extension screw thread is coated with anticorrosion compound (silicone). Explain to the trainee that this is done to help in weatherproofing the antenna.

Demonstrate how to connect one MS-116A antenna element to each female socket located on the feed cone assembly.

Demonstrate how to connect one MS-117A antenna element to each MS-116A on the feed cone assembly.

Demonstrate how to connect one AB-24 antenna element to each MS-117A on the antenna.

NOTE

Demonstrate how additional weatherproofing of the antenna assembly is done at this time by wiping excess anticorrosion compound from the antenna assembly and dressing the joints with electrical tape.

Demonstrate how to connect insulating extension to feed cone assembly and connect to mast.

Demonstrate how to secure the connector cap to the connector's protective bracket.

Demonstrate how to connect the coaxial cable to the connector located on the feedcone assembly.

Demonstrate how to attach the strain relief clamp through the fifth hole of the upper guy plate and attach it to the coaxial cable.

Demonstrate how to provide additional strain relief by taping the coaxial cable with electrical tape to the mast.

Discuss the procedures for lifting mast.

Demonstrate how to lift mast.

Demonstrate how to secure remaining guy ropes. Explain that the person that pushes the mast up holds it in place until the remaining guy ropes are secure.

NOTE

Explain to the trainee about leaving a slight slack in each guy rope to allow for expansion and contraction of the mast and guy ropes.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.12.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Selected area for construction.

Positioned base plate in center of construction area.

Hammered mast and base assembly through base plate.

Positioned stakes using assembled mast sections and adapter assembly.

Placed a guy plate on male end of lower adapter assembly and connected adapter to assembled lower mast sections.

Assembled five upper mast sections and connected to lower mast section.

Placed a guy plate on male end of upper adapter assembly and connected adapter to mast.

Aligned guy plate holes.

Measured upper and lower back guy ropes from guy plates to side stake, and then attached to back stake.

Attached upper and lower side guy ropes from guy plate to side stakes, and then tightened.

Repeated steps for other side.

Attached upper and lower front guy ropes to guy plates and laid out toward remaining stake.

Connected one MS-116A antenna element to each female socket located on the feed cone assembly.

Connected one MS-117A antenna element to each MS-116A on the feed cone assembly.

Connected one AB-24 antenna element to each MS-117A on the antenna.

Weatherproofed the antenna using silicone and electrical tape.

Connected insulating extension to feed cone assembly and connected to mast.

Secured the connector cap to the connector protective bracket.

Connected coaxial cable to feed cone assembly.

Attached the strain relief clamp to guy plate and coaxial cable.

Taped coaxial cable to mast.

Pushed and/or pulled up mast.

Attached remaining guy ropes to stake.

Tightened all guy ropes as needed.

Posted safety signs around antenna area.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered mast.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that coaxial cable is connected properly on the feed cone assembly.

Demonstrate how to check that MS-116A antenna elements are connected properly to feed cone assembly.

Demonstrate how to check that MS-117A and AB-24 antenna elements are connected properly on antenna.

Demonstrate how to check that insulating extension on feed cone is connected properly to feed cone assembly and mast.

Demonstrate how to check that weatherproofing is sufficient.

Discuss with trainee how to determine if antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.12.2 EVALUATION

Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly on the feed cone assembly.

Checked that MS-116A antenna elements were connected properly to the feed cone assembly.

Checked that all MS-117 and AB-24 antenna elements were connected properly to the antenna.

Checked that insulating extension was connected properly to feed cone assembly and mast.

Checked weatherproofing on antenna.

Determined the ability of the antenna to operate over the required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

AT-1097 DISCONE ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.13.1
- 212.14.13.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- AT-1097 Manufacturer's Manual
- Local Directives
- AFQTP Module 2

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 1.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given AT-1097 Manufacturer's Manual, local directives, AN/GRA-4 or Telescopic mast, AT-1097 Discone Antenna kit, safety equipment, and applicable tools, construct AT-1097 Discone Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given AT-1097 Manufacturer's Manual, local directives, a constructed AT-1097 Discone Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot AT-1097 Discone Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

Assign AFQTP Module 2.

Discuss the review questions and answers with the trainee.

Administer the KEP.

Check the KEP answers and review missed questions.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Discuss with trainee the area needed for construction of antenna. At this time, construct the mast but do not lift mast until antenna is connected.

Demonstrate how to attach the 12 radiator assemblies to the head by inserting their stud ends into the radiator head holes.

Demonstrate how to attach the radiator cap to the top of the antenna by snapping the cap on the antenna and giving it a 1/4 turn clockwise.

Demonstrate how to clamp the T-bar to the top of the mast.

Demonstrate how to clamp the antenna to the end of the T-bar. Make sure that when the mast is lifted, the antenna will be in a vertical position.

Demonstrate how to connect the coaxial cable to the antenna.

Demonstrate how to lift the mast. Include how to tie halyard and coaxial cable to bottom of mast.

Demonstrate where to post safety signs around antenna area.

Demonstrate how to connect coaxial cable to radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Discuss with trainee the procedures for lowering the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate how to lower antenna.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.13.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Selected area for construction.

Attached 12 radiator assemblies to the head.

Attached radiator cap to top of antenna.

Clamped the T-bar to top of the mast.

Clamped the antenna in a vertical position to the end of the T-bar.

Connected coaxial cable to the antenna.

Pushed and/or pulled up mast.

Posted safety signs.

Connected coaxial cable to radio equipment.

Disconnected coaxial cable from radio equipment.

Lowered antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that coaxial cable is connected properly on the antenna.

Demonstrate how to check if radiator assemblies are connected properly to head.

Demonstrate how to check that radiator cap is connected properly to antenna.

Discuss with trainee how to determine if antenna selected will operate over the required distance and path using applicable antenna selection chart(s).

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.13.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly on antenna.

Checked that radiator assemblies were connected properly to head.

Checked that radiator cap was connected properly to antenna.

Determined the ability of the antenna to operate over the required distance and path using applicable antenna selection chart(s).

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

DM C120/TRIVEC ANTENNA TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.14.1
- 212.14.14.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- DM C120 Technical Manual
- AV-2040 Operator's Manual
- AFQTP Module 2

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the DM C120 Technical Manual, the AV-2040 Operator's Manual, local directives, a DM C120/TRIVEC Antenna system components carrying case, safety equipment, and applicable tools, set up DM C120/TRIVEC Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the DM C120 Technical Manual, the AV-2040 Operator's Manual, local directives, a constructed DM C120/TRIVEC Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot DM C120/TRIVEC Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate how to determine the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Demonstrate how to lower tripod legs by loosening retaining screw.

Demonstrate how to turn lock ring and tighten retaining screw to secure tripod legs in down position.

Demonstrate how to pull down spring loaded collar to deploy cross-dipole elements.

NOTE

Exercise caution when deploying antenna elements. To prevent injury, point antenna away from body.

Demonstrate how to spread reflector elements.

Demonstrate how to loosen retaining nut on tripod attachment, set elevation angle, and then tighten retaining nut.

Demonstrate how to insert the extensions in the middle of the reflector element on the TRIVEC **only**. Explain the purpose of the extensions.

Demonstrate how to orient the antenna to required azimuth.

Demonstrate how to connect coaxial cable to antenna and radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Demonstrate how to disassemble the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.14.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Lowered tripod legs.

Secured tripod legs in down position.

Deployed cross-dipole elements by pulling down spring loaded collar.

Straightened out reflector elements.

Adjusted antenna to required angle.

Inserted extensions in the middle of reflector elements.

Oriented antenna to required azimuth.

Connected coaxial cable to antenna and radio equipment.

Disconnected coaxial cable from antenna.

Disassembled antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that the coaxial cable is connected properly on the antenna.

Demonstrate how to check that the cross-dipole and reflector elements are extended properly.

Demonstrate how to check that extensions are connected properly.

Demonstrate how to check if the required angle and azimuth of the satellite link are correct using applicable chart(s) and compass.

Discuss with trainee procedures for notifying appropriate maintenance section.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.14.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly on antenna.

Checked that cross-dipole and reflector elements were extended properly.

Checked that extensions were connected properly.

Checked the angle and azimuth of the antenna for the required satellite link using applicable chart(s) and compass.

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

DM C121 ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.15.1
- 212.14.15.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- DM C121 Technical Manual
- Local Directives
- AFQTP Module 2

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the DM C121 Technical Manual, local directives, a DM C121 system components carrying case, safety equipment, and applicable tools, set up DM C121 Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the DM C121 Technical Manual, local directives, a constructed DM C121 Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot DM C121 Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate how to determine the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Demonstrate how to connect antenna to tripod. **NOTE:** Legs of tripod may be lengthened to provide firm level ground position.

Demonstrate how to extend antenna elements by pushing up and down on elements as required.

Demonstrate how to adjust the ratchet teeth on the antenna and tripod to set elevation angle and tighten.

Demonstrate how to orient the antenna to required azimuth.

Demonstrate how to connect the coaxial cable to antenna and radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Demonstrate how to disassemble the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.15.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Connected antenna to tripod.

Extended antenna elements.

Adjusted the ratchet teeth on the antenna and tripod to set elevation and then tightened them.

Oriented antenna to required azimuth.

Connected coaxial cable to antenna and radio equipment.

Disconnected coaxial cable from antenna.

Disassembled antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that coaxial cable is connected properly on antenna.

Demonstrate how to check that antenna elements are extended properly.

Demonstrate how to check if the required angle and azimuth of the satellite link are correct using applicable chart(s) and compass.

Discuss with trainee procedures for notifying appropriate maintenance section, if required.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.15.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly to antenna.

Checked that antenna elements were extended properly.

Checked the angle and azimuth of the antenna for the required satellite link using applicable chart(s) and compass.

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration. Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

DM C122 ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.16.1
- 212.14.16.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- DM C122 Technical Manual
- Local Directives
- AFQTP Module 2

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the DM C122 Technical Manual, local directives, a DM C122 antenna system components carrying case, safety equipment, and applicable tools, set up DM C122 Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the DM C122 Technical Manual, local directives, a constructed DM C122 Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot DM C122 Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate how to determine the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Demonstrate how to lower tripod legs and tighten. Explain how to adjust legs for uneven ground.

Demonstrate how to unlock center extension clamp, raise column to full height, and relock in place.

Demonstrate how to connect the antenna to the tripod by loosening gear disk, slide antenna into slot on gear disk, and tighten to required elevation angle using index marker on tripod.

Demonstrate how to connect remaining antenna extensions on antenna and clamp into place.

Demonstrate how to extend antenna elements by pushing up and down on elements as required.

Demonstrate how to connect dipole and parasitic elements.

Demonstrate how to orient the antenna to required azimuth.

Demonstrate how to connect coaxial cable to antenna and radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Demonstrate how to disassemble the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.16.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Lowered tripod legs.

Secured tripod legs in down position.

Raised column to full height and locked in place.

Connected antenna to tripod and set elevation angle by sliding antenna into gear disk and tightening.

Connected remaining antenna extensions to antenna.

Extended antenna elements to proper position.

Connected dipole and parasitic elements.

Oriented antenna to required azimuth.

Connected coaxial cable to antenna and radio equipment.

Disconnected coaxial cable from antenna.

Disassembled antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are connected properly at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are connected properly at the radio.

Demonstrate how to check that power cables are connected properly at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that the coaxial cable is connected properly on antenna.

Demonstrate how to check that antenna extensions are connected properly.

Demonstrate how to check that antenna elements are extended properly.

Demonstrate how to check that dipole and parasitic elements are connected properly.

Demonstrate how to check the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Discuss with trainee procedures for notifying appropriate maintenance section.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.16.2 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly on antenna.

Checked that antenna extensions were connected properly.

Checked that antenna elements were extended properly.

Checked that dipole and parasitic elements were connected properly.

Checked the angle and azimuth of the antenna for the required satellite link using applicable chart(s) and compass.

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

DM C152 ANTENNA
TASK TRAINING GUIDE

TRAINEE'S NAME _____

AFJQS TASK NUMBER(S)

- 212.14.17.1
- 212.14.17.2

ESTIMATED TASK TRAINING TIME _____

TRAINING REFERENCE(S)

- DM C152 Technical Manual
- Local Directories
- AFQTP Module 2

PREREQUISITE(S)

- Required equipment and/or materials:

  Hammer
  Measuring tape
  Wire cutters
  Compass

- Downtime/user release is/is not required.
- Ensure trainee has completed AFQTP Module 2.

TRAINING OBJECTIVE(S)

- OBJECTIVE 1: Given the DM C152 Technical Manual, local directives, a DM C152 antenna system components carrying case, safety equipment, and applicable tools, set up DM C152 Antenna IAW prescribed procedures.

- OBJECTIVE 2: Given the DM C152 Technical Manual, local directives, a constructed DM C152 Antenna with one or more actual or simulated fault(s), safety equipment, and applicable tools, troubleshoot DM C152 Antenna IAW prescribed procedures.

INITIAL TRAINING STEPS (check when completed)

Discuss the objective for the task, including the work center speed and accuracy standards for performing the task. Also, discuss the conditions under which it is normally performed.

OBJECTIVE 1 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 1 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate how to determine the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Demonstrate how to position tripod legs by grasping tripod base plate, pulling down on top portion of leg, and rotating to desired position. Repeat until each leg is positioned.

Demonstrate how to extend antenna elements by pushing up and down on elements as required.

Demonstrate how to loosen retaining nut on antenna and place antenna on tripod mount, set elevation angle, and tighten retaining nut.

Demonstrate how to orient the antenna to required azimuth.

Demonstrate how to connect coaxial cable to antenna and radio equipment.

Discuss with trainee the characteristics of the antenna, including frequency range, polarization, radiation pattern, and antenna advantages and disadvantages.

Demonstrate how to disassemble the antenna. Make sure trainee understands that the antenna is to be disconnected from the radio equipment before being lowered.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.17.1 EVALUATION

- Have trainee perform task steps unassisted and evaluate performance IAW the following checklist. (Return to OBJECTIVE 1 TRAINING STEPS if evaluation is unsatisfactory.)

Determined the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Positioned tripod legs.

Extended antenna elements to proper position.

Placed antenna on tripod, set elevation, and tightened.

Oriented antenna to required azimuth.

Connected coaxial cable to antenna and radio equipment.

Disconnected coaxial cable from antenna.

Disassembled antenna.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

Assign the next task for training.

OBJECTIVE 2 TRAINING STEPS

Using technical references and the checklist in the Task Evaluation below as guidance, discuss the task steps for achieving objective 2 with trainee. Ensure all Notes, Cautions, and Warnings listed in the TO for each step are covered. Brief the trainee on all safety precautions and local procedures that apply.

Explain to trainee the purpose of this procedure.

Demonstrate where the On/Off switch is located on the radio equipment. Explain that checking the position of this switch is the first step to take in troubleshooting equipment.

Demonstrate how to check the ground rod and cables to ensure they are properly connected at their respective equipment. Explain the purpose of the ground rod.

Demonstrate how to check that power and antenna cables are properly connected at the radio.

Demonstrate how to check that power cables are properly connected at the generator distribution box and shelter entry panel, if using generator power.

Demonstrate how to check power source. If using generator power, follow local OIs. If using battery operated radios, check battery and replace if necessary.

Demonstrate how to check that the coaxial cable is properly connected on antenna.

Demonstrate how to check that antenna elements are extended properly.

Demonstrate how to check the required angle and azimuth of the satellite link using applicable chart(s) and compass.

Discuss with trainee procedures for notifying appropriate maintenance section.

Demonstrate correct task performance.

Review task steps with trainee and answer any questions.

Disconnect all test equipment used. Restore system to normal operating configuration.

Have trainee practice steps and assist as necessary.

TASK 212.14.17.2 EVALUATION

- IAW the following checklist. (Return to OBJECTIVE 2 TRAINING STEPS Have trainee perform task steps unassisted and evaluate performance if evaluation is unsatisfactory.)

Checked On/Off Power switch.

Checked ground rod and cable connections.

Checked antenna and power cables at radio.

Checked power cables at the generator distribution box and shelter entry panel, if generator power was used.

Checked power source (generator or battery).

Checked that coaxial cable was connected properly on antenna.

Checked that antenna elements were extended properly.

Checked the angle and azimuth of the antenna for the required satellite link using applicable chart(s) and compass.

Notified appropriate maintenance section, if required.

Restored system to normal operating configuration.

Trainee is ready to be certified on this AFJQS task. Follow local certification procedures.

TRAINING COMPLETION CERTIFICATION FOR
AFJQS/AFQTP XXXXX-212N
TACTICAL ANTENNAS

I certify that _____
(Please print trainee's full name and rank)

completed all requirements for the above AFJQS/AFQTP.

_____
SUPERVISOR'S NAME, RANK, DUTY TITLE, DSN **(Please Print)**

_____
UNIT MAILING ADDRESS, INCLUDING ZIP CODE **(Please Print)**

_____
E-MAIL ADDRESS **(Please Print)**

_____
SUPERVISOR'S SIGNATURE

Please complete the above information, attach the completed and graded KEP answer sheet(s), and submit to 81 TRSS/TSQS, 601 D Street, Keesler AFB MS 39534-2229 (or FAX your answer sheet(s) to 597-9043).

TRAINER/TRAINEE: You have completed an AFJQS/AFQTP, and we need your feedback. Please fill out the following survey. If you found any errors or have suggestions for improvements, please tell us. Take advantage of this opportunity to express your ideas directly to the AFJQS/AFQTP development teams. List the errors you discovered in as much detail as possible. If you have product improvement suggestions, describe your ideas clearly and in a logical order. Thank you for your time and interest.

In the space provided, indicate your preference by placing the number corresponding to the following scale:

1. STRONGLY AGREE 2. AGREE 3. UNCERTAIN 4. DISAGREE 5. STRONGLY DISAGREE

TRAINEE

1. Training Material

a. The objectives were easy to understand. ___

b. The instructions were easy to understand. ___

c. The review and test questions reinforced the objective statement. ___

d. This is a high quality training package. ___

2. Training Material Presentation

a. I have easy access to a computer in my workplace. ___

b. Material was easy to read and presented in a logical sequence. ___

3. In my opinion

a. The Q Flight web page helps me stay current with training issues. ___

b. This training package accurately reflects my job requirements. ___

c. This package will help me be proficient in my career field. ___

d. After completing this package, I can do my job better. ___

TRAINER

1. Training Material

a. Instructions in the Trainer's Guide were clear and concise. ___

b. The objectives in this package were clear and attainable. ___

c. I have all the technical references listed for this package. ___

d. The figures, diagrams, and flowcharts helped student understanding. ___

e. The KEP questions measured the attainment of the objective. ___

2. In my opinion

a. This training package accurately reflects trainee job requirements. ___

b. This package helped make trainees proficient in their career field. ___

c. The Q Flight web page helps me stay current with training issues. ___

d. After completing this package, trainees can do their job better. ___

e. QTPs meet training needs. ___

3. In general

a. How do you receive our products?

QMAIL

Web Page

Other (Specify)

b. Which method of delivery do you prefer?

Electronic

Hard copy

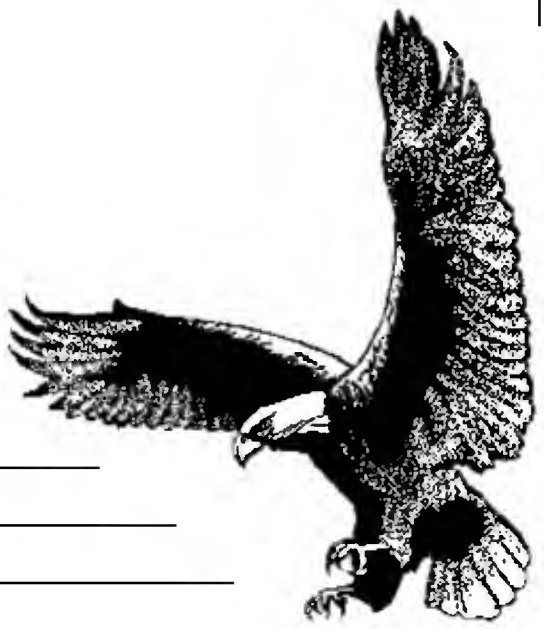
OTHER COMMENTS OR SUGGESTIONS FOR IMPROVEMENT:

AIR FORCE QUALIFICATION TRAINING PACKAGE XXXXX-212N

PART OF AFJQS XXXXX-212N

TACTICAL ANTENNAS

Skill Training Material



2 FEBRUARY 2000
SUPERSEDES AFJQS XXXXX-212N
DATED 1 OCTOBER 1999

FOR OJT USE ONLY

SKILL TRAINING MATERIAL

CONTENTS

ABOUT THIS TRAINING PACKAGE

The purpose of this Air Force Qualification Training Package (AFQTP) is to

- standardize on-the-job training.
- reduce training time while maintaining proficiency standards.
- provide individuals with a logically organized training plan which yields immediate and measurable feedback.
- provide a standard to measure task knowledge and performance during personnel evaluations.

This training package was developed by SSgt. Ronald E. Maples and revised by MSgt Ronald E. Dupree, 81 TRSS Qualification Training Flight, Keesler AFB, MS. The Training and Education Specialist was MSgt William Bowman. MSgt Rollin M. Calhoun, 2 CCS, Barksdale AFB, LA; SSgt Jerry B. Edwards, HQ AFSOC, Hurlburt Field, FL; and SSgt Terrell Thomas, 12 CCS, Davis-Monthan AFB, AZ, supported the development as tactical antenna subject matter experts. It was field tested and validated at HQ ACC, HQ AFSOC, 2 CSS, and 12 CSS.

For more information on the 81 TRSS Qualification Training Flight and a list of other products that are available, feel free to visit our home page at http://www.keesler.af.mil/81trss/qflight.

HOW TO USE THIS TRAINING PACKAGE

INSTRUCTIONS FOR THE TRAINEE

- Ensure your trainer explains how to complete this training package.
- As you read each section in the module, answer the review questions pertaining to that section. You may use the module and technical references to answer the questions. You'll find the answers to these review questions at the end of each module.
- When you finish the module, your trainer will administer the Knowledge Evaluation Pamphlet (KEP). Answer all KEP questions and give the answer sheet to your trainer for grading. Your trainer will discuss any incorrect answers with you.
- When you complete the AFQTP, your trainer should give you the Training Completion Certification so you may make any recommendations, suggestions, or offer corrections to the training package in the comments section. Your inputs

provide us with valuable feedback which enables us to give our customers the best possible training materials.

MODULE 1
HIGH FREQUENCY/VERY HIGH FREQUENCY TACTICAL ANTENNAS

ABOUT THIS MODULE

This module provides information about and briefly explains HF/VHF propagation, HF/VHF antenna fundamentals, and tactical antenna siting. It discusses the different HF/VHF antennas, how to build a field expedient antenna, and antenna safety. It also includes a brief introduction to troubleshooting.

OBJECTIVE(S)

- Explain HF/VHF propagation fundamentals.
- Explain HF/VHF antenna fundamentals.
- Explain siting HF/VHF tactical antennas in a tactical environment.
- Discuss the different HF/VHF tactical antennas.
- Explain how to build a tactical HF/VHF field expedient antenna.
- Explain basic troubleshooting on tactical antennas.
- Explain antenna safety.

TRAINING REFERENCE(S)

Field Antenna Handbook
B and W Model AC2-22 Antenna Manual
Eyring Low Profile Antenna Training Manual
DHV Technical Manual
OE-254/GRC Technical Manual
TO 31R2-2GRA-101
Field Antenna Handbook

HF/VHF PROPAGATION FUNDAMENTALS

There are several methods of propagation for the use of transmitting HF and VHF frequencies. This section explains ground-wave and sky-wave propagation and the HF and VHF frequency spectrum.

HF SPECTRUM

The HF Spectrum from 3 to 30 MHz can transmit signals via ground wave or sky wave.

GROUND-WAVE PROPAGATION

Ground Wave Propagation involves the transmission of a radio wave along or near the surface of the earth. The ground wave is made up of three components: direct, ground-reflected, and surface waves. The effectiveness of ground waves depends on the RF (lower frequencies work better), transmitter power, antenna characteristics, and the terrain. In normal application, ground wave is effective up to 100 miles.

SKY-WAVE

Sky-wave propagation is made possible by the bending (refraction) of radio waves by the ionosphere. The effectiveness of sky-wave propagation depends on the RF, time of day, and antenna characteristics. In normal application, sky-wave transmissions are used when ground-wave paths are no longer effective

VHF SPECTRUM

The VHF part of military frequency range is from 30 to 88 MHz. Its signals propagate principally by LOS. The effective range depends on the height of transmit antenna, receive antenna, and terrain. In normal application, LOS is effective up to 50 miles.

1. What are the three components that make up a ground wave?

2. What is the military frequency range of the VHF spectrum?

ANTENNA FUNDAMENTALS

ANTENNA POLARIZATION'S

The two types of antenna polarization are horizontal (parallel to the earth's surface) and vertical (perpendicular to the earth's surface). A vertical antenna normally radiates a vertically polarized wave, and a horizontal antenna normally radiates a horizontal wave. For **optimum** communications, both the transmit and receive antenna should have the same polarization.

RESONANT AND NON-RESONANT ANTENNAS

Antennas can be classified as either resonant or non-resonant. A resonant antenna effectively radiates a radio wave for frequencies close to its design frequency, usually only 2 percent above or below the design frequency. The antenna length for resonant antennas is calculated using the half-wave formula: antenna length = 468 divided by the frequency (in MHz). A non-resonant antenna, on the other hand, radiates over a broad range of frequencies with lower efficiency.

ANTENNA PATTERNS

Antenna patterns graphically show the radiation pattern for a specific antenna. Antennas are classified according to how radio waves are radiated: omnidirectional, bidirectional, or directional. Areas that radiation will pass through are called lobes, and the areas where there is no radiation are called nulls. An omnidirectional antenna radiates radio waves in a circular pattern. A bidirectional antenna has two main lobes opposite each other with nulls between. A directional antenna has a single large lobe in one direction. Figure 1-1 shows the different antenna patterns.

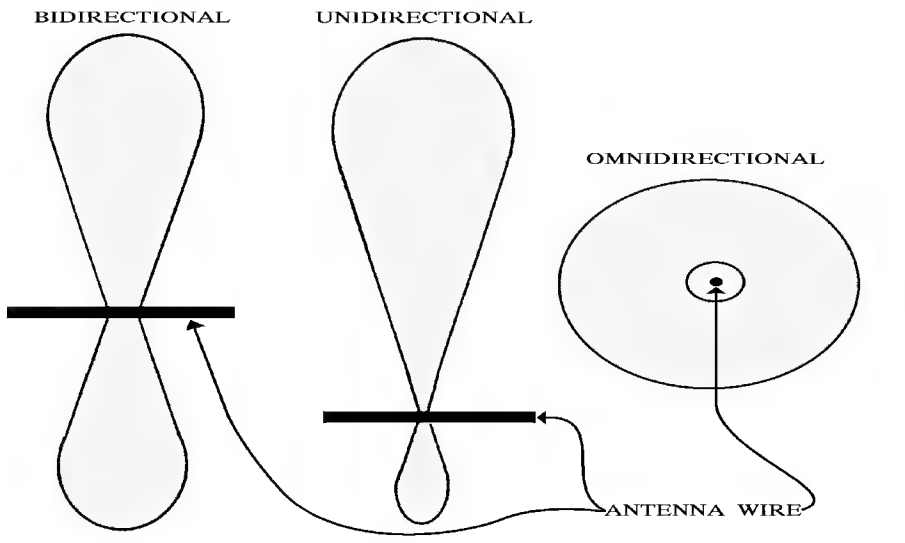


Figure 1-1. Antenna Patterns

TAKE-OFF ANGLES

The take-off angle of an antenna is the angle above the horizon where the antenna radiates the largest amount of energy; that is, the angle of radiation with the highest gains. Gain is the term

used to describe how well an antenna radiates power. The desired take-off angle for sky-wave communications depends on the circuit distance. High take-off angles are used for shorter paths, and low take-off angles are used for longer paths. Ground effects must be taken into consideration when working with tactical antennas.

GROUND EFFECTS

If the electrical characteristics below the antenna are poor, there will be large radio wave losses in the ground, resulting in poor radiation by the antenna. It is important to remember that antennas, **especially** quarter-wave vertical antennas, need a good ground to work properly. Use ground radials and counterpoises to enhance the electrical characteristics below the antenna. Ground radials consist of several wires, roughly a quarter-wavelength long, radiating from the center of, and below, the antenna. In HF communications, the ground radials are placed on or in the ground. In VHF communications, where the antennas are placed as high as possible, use tubing to provide the ground required for the antenna to work properly. A counterpoise is a structure made of wire, erected a short distance above and insulated from the ground. The physical and electrical size of the counterpoise **must** be equal to, or larger than, the antenna. Be careful with counterpoises, a poorly insulated counterpoise decreases the effectiveness of your antenna instead of enhancing it.

ANTENNA COUPLERS AND BALUNS

Couplers allow many resonant antennas to be used over a much broader range of frequencies without recutting the antenna. Baluns are used to match unbalanced coaxial cable to balanced antennas. Baluns, unlike couplers, are used on antennas that are cut for a specific frequency. More is taught about couplers and baluns during the construction of the antenna.

3. Which formula is used to find the length of a Dipole/Doublet antenna?

4. What are the two different types of polarization?

5. What do you use with vertical antennas to improve their efficiency?

6. Which type of take-off angle is used for short-range communications?

7. Which type of take-off angle is used for long range communications?

8. What are antenna lobes and nulls?

9. What is the directivity of an antenna that radiates its energy in two favored directions?

10. What is an antenna coupler used for?

SITING HF TACTICAL ANTENNAS IN A TACTICAL ENVIRONMENT

There is considerably more to siting an antenna system than finding an open area and erecting your antenna; many factors must be taken into consideration. The type of circuit you are attempting to establish (ground wave or sky wave) determines which set of criteria to use.

GROUND WAVE

To optimize a ground-wave circuit, plan on using a vertically polarized antenna. When you arrive at your location, select an area that is free of obstructions and heavy foliage for at least one wavelength in the direction(s) of desired operations. Try to pick an area with good ground characteristics (moist ground or low marshy area is the best); if this is not possible, use a counterpoise. Rocky terrain, desert, and jungle are examples of poor ground surfaces that might require a counterpoise. Finally, try to select an area that has good terrain to the distant station.

SKY WAVE

Site selection for a sky-wave circuit is a bit more involved. First, select the antenna best suited for the circuit, and then, taking into consideration the antenna's characteristics, select the best area to erect your antenna. The area you choose needs to be free of obstructions (the required distance for obstructions is dependent on the take-off angle of your antenna; the higher the take-off angle, the closer you can be to an obstruction). The area should have good ground characteristics. Finally, the area needs to be large enough to support the chosen antenna type and to be reasonably close to the operations area (this avoids excessively long coaxial cable runs).

To select the antenna best suited for your circuit, you need to know:

- location(s) of your distant station(s) using applicable chart(s), or road map(s), and compass,
- distance to the closest station, and
- distance to the farthest station.

Location(s) of your distant station(s) will determine if you can use an omnidirectional, bidirectional, or directional antenna system. The distance to your distant stations dictates the propagation characteristics of the antenna system you need to choose (NVIS, single-hop sky wave, or multi-hop sky wave). If you have stations of varying distance from your site, a compromise normally has to be made (who will you have the **best** communications with) depending on which station is the **most** important for you to communicate with on a daily basis.

RADIO PATHS

The following are different transmission paths that comprise ground wave and sky wave propagation.

SHORT RANGE GROUND WAVE

This involves the transmission of a radio signal along or near the surface of the earth. Low powered man-pack radios can provide reliable communications up to approximately 20 miles. High-powered vehicular mounted systems can provide reliable communications up to approximately 60 miles.

SHORT RANGE LOS

The LOS path normally employs frequencies above 30 MHz (VHF communications) and is reliable up to 50 miles (dependent on the terrain).

SHORT RANGE SKY WAVE

Beyond the range covered by the ground-wave signal, communications are possible through sky-wave propagation (refracting radio waves off the ionosphere). The short path is from 0 to 250 miles. The NVIS antennas are normally used on this path.

MEDIUM RANGE SKY WAVE

The medium path is from 250 to 800 miles. Antennas for this path will normally be horizontally polarized, but can be vertical. As with the short path, the objective is to produce radiation at a prescribed angle to the ionosphere.

LONG RANGE SKY WAVE

The long path is 800 miles and beyond. Antennas for this path will normally be vertically polarized (with some horizontal characteristics) and be bi or uni-directional. The long path requires antennas that produce radiation at low angles (low take-off angles).

The communicator now has sufficient information to begin a tentative selection of antenna(s).

11. Why is it important to determine the distant station(s) bearing before selecting an area for your antenna?

12. Which radio path employs frequencies above 30 MHz and is reliable up to 50 miles?

HF/VHF TACTICAL ANTENNAS

ANTENNA MASTS

The most common type of antenna masts used as support for tactical antenna systems are the AN/GRA-4 (commonly called "gray four") and Carrymast-15H (commonly called "telescopic"). These masts are used as supports for many different types of tactical antennas.

AN/GRA-4 MAST

The GRA-4 mast assembly contains 16 metal mast sections, a whip adapter, a counterpoise, a halyard, an insulator, associated guy ropes, and stakes. One person can carry it (the mast assembly kit weighs 60 pounds). By using the antenna adapters provided with the mast, the mast itself can be used as a whip antenna.

CARRYMAST-15H

The 15H mast assembly contains a 50-foot telescoping mast, halyard, associated guy ropes, and stakes. One person can carry it (the mast assembly kit weighs 35 pounds). Unlike the GRA-4 mast, the 15H cannot be used as a whip antenna; its mast sections are made of non-conductive material.

DIPOLE/DOUBLET

The horizontal half-wave Dipole, or Doublet, is a versatile antenna used for short to medium range sky-wave paths. Since it is relatively easy to construct, the doublet is the **most** often used tactical wire antenna (see figure 1-2).

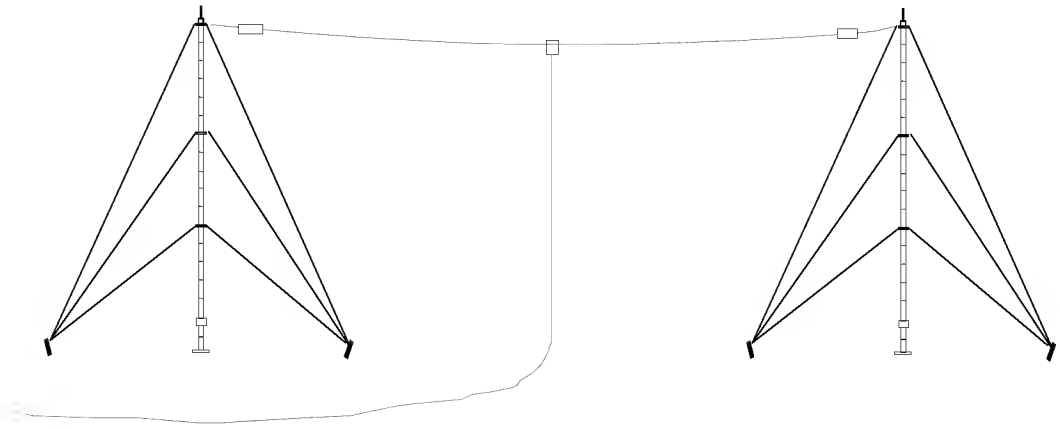


Figure 1-2. Dipole/Doublet

By varying the antenna's height above ground, you can alter the take-off angle. An antenna placed one-quarter wavelength above the ground produces a high take-off angle, and an antenna placed at one-half wavelength produces a low take-off angle. The Doublet is a bidirectional antenna that has maximum gain at right angles to the antenna. The Dipole is a resonant antenna (cut to a specific frequency). An antenna

coupler can be used to make it non-resonant (cover a broad spectrum of frequencies). It is horizontally polarized. For best results, the broadside of the antenna must face the distant station.

FOLDED DIPOLE

The Folded Dipole, like the Dipole, is used for short to medium range sky-wave paths. The Folded Dipole is a versatile antenna in that you can alter the take-off angle and the directivity of the antenna by adjusting its height above the ground (the same as the Dipole/Doublet) and configuration. If a more omnidirectional pattern is required, the ends of the antenna can be dropped to resemble an Inverted Vee Antenna. If a more directional pattern is required, the ends can be dropped and the apex angle closed towards the distant station to resemble a Sloping Vee antenna. Also, by dropping one end of the antenna to the ground and pointing 10 to 15 degrees right or left of the distant station, you can create an antenna that resembles a Sloping Long-wire. The Folded Dipole is a non-resonant antenna capable of operating from 3.5 to 30 MHz without the use of an antenna coupler.

INVERTED "L"

The Inverted "L" is used for short to medium range sky wave and ground wave paths. The Inverted "L" is a combination antenna made up of a vertical section and a horizontal section (see figure 1-3).

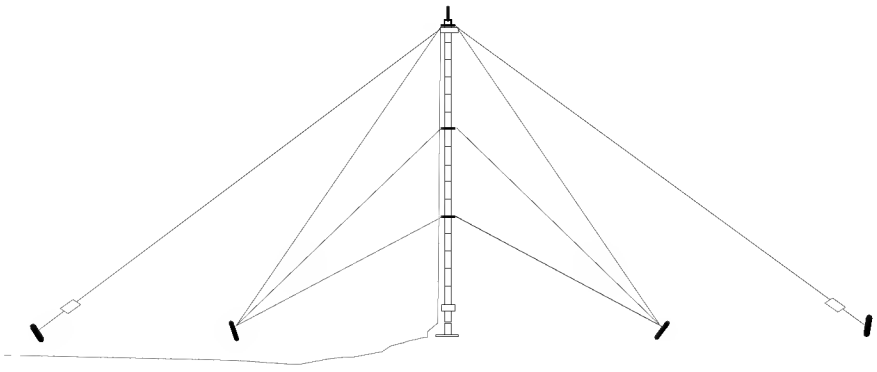


Figure 1-3. Inverted “L”

The Inverted "L" operates over a very narrow range of frequencies. The length of the horizontal element determines the frequency range. The use of an antenna coupler makes it non-resonant (cover a broad spectrum of frequencies). Due to

the combination of a vertical and horizontal element, the antenna is omnidirectional. Even though the antenna is omnidirectional, the broadside of the antenna should face the distant station.

INVERTED VEE

The Inverted Vee is used for short to medium range sky wave and ground wave paths. The Inverted Vee is similar to the Dipole but uses only a single center support. Like the Dipole, it is designed and cut for a specific frequency. Because of its inclined sides, the Inverted Vee exhibits both vertical and horizontal radiation characteristics (vertical off the ends and horizontal broadside to the antenna). The antenna is omnidirectional.

Sloping Long-wire. The Sloping Long-wire antenna is used for medium to long range sky wave and ground wave paths. A minimum length for a long-wire antenna is one wavelength; however, antennas that are at least several wavelengths long are needed to obtain good gain and increased directivity. The construction of a long-wire antenna is simple; there are no critical dimensions or adjustments (see figure 1-4).

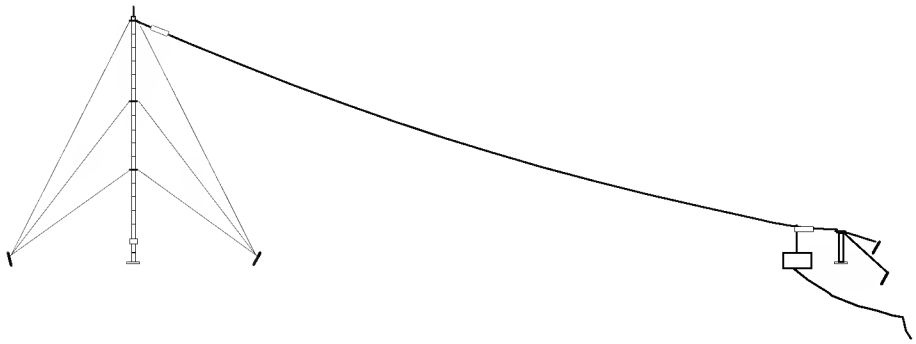


Figure 1-4. Sloping Long-wire

The long-wire antenna radiates well on any frequency for which its overall length is not less than one-half wavelength. When constructed, the low end of the antenna is pointed 10 to 15 degrees right or left of the distant station. The long-wire antenna is normally bidirectional, but can be made directional by placing a terminating resistor at the distant station end of the antenna. Terminating resistors are used to absorb the radio wave emitting off the back of the antenna.

MULTIFREQUENCY DOUBLET

The Multifrequency Doublet is identical to the classic Dipole/Doublet in all respects, except that it can have up to four antenna elements supported by the masts (see figure 1-5). Each element is cut to a specific frequency. This configuration is necessary if you have multiple frequencies assigned, and an antenna coupler is not available.

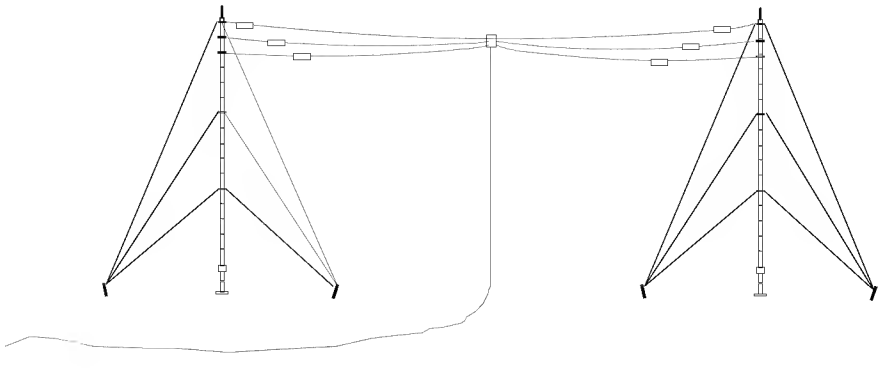


Figure 1-5. Multifrequency Doublet

EYRING LOW PROFILE

The Eyring Low Profile antenna is used for short to medium sky wave and ground wave paths. This is one of the "ground cooperative" antenna systems designed to perform near to, on the surface of, or buried in the earth (see figure 1-6). This antenna does not need a mast assembly. It requires an area of 66 feet X 150 feet for deployment. It is a non-resonant antenna with a frequency range of 2 to 30 MHz. It is vertically polarized and omnidirectional. It can, however, be considered bidirectional for ground wave use. When the construction of the Eyring Low Profile antenna is explained, the orientation of the antenna toward the distant station is discussed.

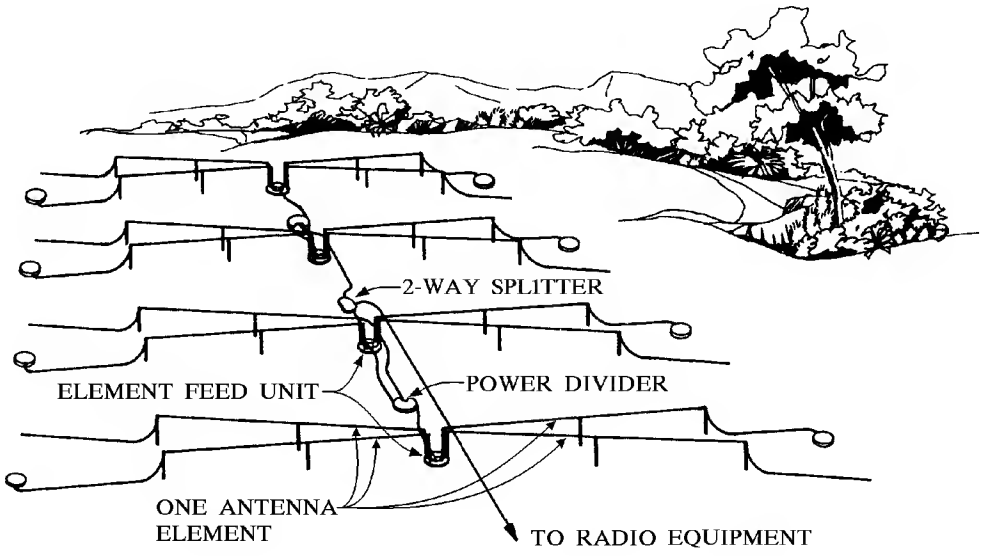


Figure 1-6. Eyring Low Profile

AS-2259 (NVIS ANTENNA)

The AS-2259 antenna was designed to provide NVIS propagation for short-range circuits. The antenna consists of two crossed sloping dipoles positioned at right angles to each other and supported at the center by a 15 foot whip antenna that acts as a mast (see figure 1-7).

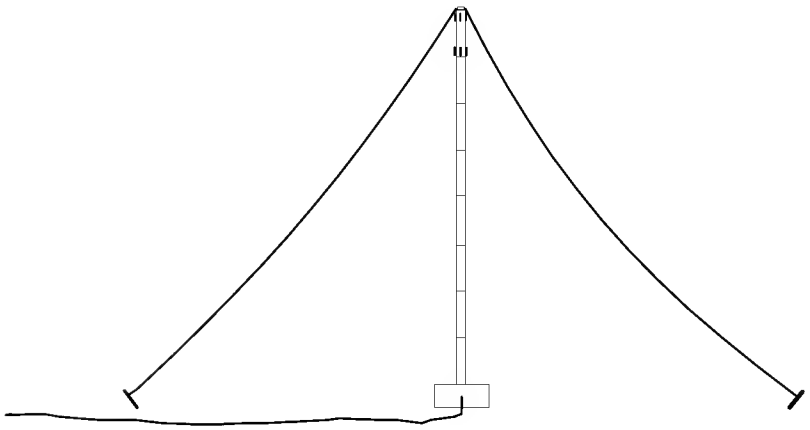


Figure 1-7. AS-2259 (NVIS)

In use, the dipole elements provide guying support for the mast. The AS-2259 is both horizontally and vertically polarized (making it omnidirectional) and has a frequency range of 3 to

30 MHz. The antenna kit weighs 14 pounds and requires a 60 feet X 60 feet area for installation.The antennas are used over the HF frequency spectrum. The antennas were identified as the most widely used HF tactical antennas. Another antenna system that operators will be required to erect is VHF antennas.

DC-80

The DC-80 is a broadband, omnidirectional, horizontally polarized VHF antenna. It consists of eight active elements and eight reflectors. The frequency range is from 80 to 230 MHz. The DC-80 is best suited for short range LOS and/or air-to-ground communications.

OE-254/GRC

The OE-254 is a broadband, omnidirectional, biconal VHF antenna. The OE-254 does not require tuning for specific bands and can cover the 30 to 88 MHz VHF band without adjustment. Three upward and three downward radial elements simulate two cones, which provide the omnidirectional VHF-LOS radiation. The antenna is normally installed on a 33-foot mast, but can be mounted at any height. The antenna is vertically polarized.

At this point, you should have a basic understanding of tactical antennas and their applications. You will gain knowledge and experience through usage.

?

13. How is the take-off angle of a Dipole/Doublet changed from low to high?

14. How is the Dipole/Doublet antenna oriented towards the distant station?

15. How is the Sloping Long-wire antenna oriented towards the distant station?

16. What does NVIS stand for?

17. What are the NVIS type antennas used for?

18. What is the DC-80 used for?

TACTICAL HF FIELD EXPEDIENT ANTENNAS

Using an issued antenna or constructing a field expedient antenna is easy if you have all the required parts. What happens if in a field situation, your antenna is destroyed or you have to improvise another antenna with different radiation characteristics due to a changing operational or geographical environment, and you have to make do with what you have? Obviously, communications must be maintained. The radio operator must make some type of antenna to provide unit communications.

INSULATORS

The primary purpose of an insulator is to confine the electromagnetic waves to just the antenna wire. Insulators can be made from many items that are readily available. If possible, avoid any material that holds water (cloth, rope, wood, etc.). In a rainstorm, these items absorb water and lose their insulating characteristics. Some of the types of materials to use for substitutes are plastic and glass (best) and wood (good). Insulated wire can be used for temporary insulators, as long as the wire inside the insulator doesn't touch the antenna itself.

SUPPORTS

Many expedient antennas require supports to hold the antenna above the ground. The most common supports are trees, buildings, towers, and vehicles. The operator must use imagination and ingenuity to devise some types of support to provide reliable communications.

SHORT RANGE PATH

The best antenna to improvise for short range is the well-known whip antenna. A simple way to improvise a whip is to throw a rope over a tree limb and hoist up the antenna wire, field wire, or barbed wire (whatever is available). Once the wire is up, secure the rope to the tree and the bottom of the wire to a stake. Ensure your antenna is insulated from the rope and stake and not touching the ground or the tree. This antenna works fine for

the higher HFs. Remember, the higher the frequencies, the shorter the antenna. If a coupler is not available, the antenna must be cut to frequency using the quarter-wavelength formula: 234 divided by frequency in MHz.

MEDIUM RANGE PATH

If your mission requires communications in the medium range (250 to 800 miles), the Inverted Vee Antenna is a good antenna to improvise. This antenna is easily erected (much like the whip) and positioned and does not require a large area to be constructed. A simple way to improvise an Inverted Vee is to first cut the antenna to the required frequency using the half-wave formula: 468 divided by frequency in MHz divided by 2. However, this is not required if an antenna coupler is used. Take a rope and connect it to the balun or cobra head located in the center of the antenna, throw the rope over a tree limb, hoist up the antenna wire, and secure the rope to the tree. Adjust the antenna legs to the required position and stake down. Ensure the antenna is insulated from the rope and stake and not touching the ground or the tree. Remember, if a more directional pattern is required, close the apex angle on the antenna towards the distant station.

LONG RANGE PATH

If your mission requires long range (800 miles and beyond) communications, the Sloping Long-wire antenna is a good antenna to improvise. Like the whip and Inverted Vee, the Sloping Long-wire requires only one support. In addition to using a tree as mentioned on the whip and Inverted Vee, the side of a building, tower, or vehicle are acceptable supports for the Sloping Long-wire.

We now discuss improvising using a vehicle as a support. Remember, the antenna must be a minimum one wavelength--the longer the antenna (two or more wavelengths), the better the gain and directional characteristics. The antenna will be connected to the radio at the low end. Connect one end of the antenna to the top of the vehicle and secure the other end to a stake. Ensure the antenna is insulated from the rope and stake and not touching the vehicle or ground. Remember that the low end is to be pointed 10 to 15 degrees right or left of the distant station. When improvising a field expedient antenna, do not give up. No one will laugh at your "makeshift contraption" but will likely compliment you for your ingenuity. Your primary goal is to accomplish the mission no matter what it takes.

?

19. Why should the weather be considered when using rope or cloth for insulators?

20. What are the most common improvised supports used?

TROUBLESHOOTING

SAFETY

As you perform antenna troubleshooting procedures, it is vital to pay particular attention to the safety precautions. You are never physically closer to the risk of electrocution and/or RF radiation burns than when troubleshooting an antenna system; therefore, the need for safety is paramount. If possible, never work alone.

TROUBLESHOOTING PROCEDURES

Once you identify a problem with your antenna system (by running a radio self-test or losing communications with distant stations), there are several actions that you, as an operator, can perform. Ensure the radio equipment is on-line. Check all connections--they should be tight and free of corrosion. This is true for coaxial cable connections and grounds (both power and at the antenna). If using battery operated radios, check the battery and replace if necessary. Check that antenna elements are connected to the cobra head or balun properly. If you are experiencing a problem with high-reflected power at your radio set, it is most likely a coupler problem. If a coupler is **not** being used, your antenna is **not** cut to the designed frequencies. Remeasure your antenna elements and adjust, if necessary. It may be only a few inches that caused your antenna to be out of tolerance. Check that the antenna is pointed in the required direction (this is especially important with directional antennas). When all else fails or you cannot correct the problem, notify the appropriate maintenance section.

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21. What is the most likely cause if your radio set is experiencing high reflected power?

22. What actions can an operator perform when experiencing radio equipment trouble?

ANTENNA SAFETY

There are all types of hazards involved when installing, making, measuring, fixing, or working with antennas. We discuss the basic, unsophisticated safety hazards like tripping, falling objects, and other items of that nature. Then, we move to electrocution and the more sophisticated radiation hazards.

TRIPPING

Never leave coaxial cable or other wires lying around. Try to run your cable through areas that receive the least amount of traffic and if possible, bury all cables. Guy wires and stakes also present tripping hazards. Cables and wires that must remain above the ground should (unless camouflage is **extremely** important) be identified with safety signs or flagging tape.

WALKING INTO OBJECTS

Usually on deployments, there are hazardous above ground objects (such as guy wires, poles, masts, elevated cables, etc). Again, identify these potential safety hazards with safety signs or flagging tape.

FALLING OBJECTS

With tactical antennas, falling objects are likely to be antennas or masts. When a mast is being worked on, do not stand at its base (or within falling distance). Use **"hard hats"** (or **combat helmets**), gloves, proper equipment, and sufficient personnel when erecting a mast, pole, or tower. Most problems with falling objects stem from improper guying and not paying attention. Again, people should not stand under the mast or in line with the direction it might fall. **Be alert at all times!**

STEPPING INTO HOLES

Sometimes, you have to dig holes for poles; later the poles may be removed and the holes not filled. Also, upon arrival at a new deployment site, natural or manmade holes may already exist. Do a check of the area and fill all holes. Stepping in a hole can cause serious injury.

TOUCHING ANTENNAS

To avoid electrocution, **NEVER TOUCH** an antenna! Probably the most dangerous antennas are vertical antennas--base loaded GRA-4 masts (Whip), Inverted L, Invert Vee, and Sloping Long-wire. Even though most whip antennas are fiberglass encapsulated, don't press your luck. Be extremely cautious when touching a metal support mast--it may not be a support but an active antenna. Plainly mark all antennas by posting safety signs around the antenna area.

RADIATION HAZARDS

Radiation hazard is probably the most dangerous hazard because you don't trip over it or touch it; you just have to be near it. Seeing a microwave cook a hamburger in 3 minutes gives you an idea of what could happen to you if you get too close to an antenna. Even if you are not really close to the antenna (just in the main beam), prolonged exposure can have severe medical effects. Mark radiation hazard areas with fences, ropes, safety signs, or flagging tape to prevent accidental entry. For safety purposes, use a 10-foot radius around the antenna when marking.

Safety around antennas is a serious subject. There is much information that can be covered here. Take all precautions in erecting and installing antennas to prevent accidental contact by using safety signs or flagging tape once the antennas are constructed. Always be safety conscious when you work on antennas.

23. What is the most dangerous form of antenna hazard?

24. Which dangers exist during antenna construction?

25. What is the last thing done before the antenna is connected to the radio?

SUMMARY

Ingenuity, common sense, and a good foundation in radio operations are essential in the composition of a successful tactical communicator. This module introduced you to basic tactical communications using HF/VHF tactical antennas. Most of the subject matter was barely touched on. Full understanding can only be achieved through actual hands-on experience and additional studying.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test, and you must score 70 percent or more. Your trainer will check your answers and review any incorrectly answered questions with you. When you achieve the KEP standard, your trainer will assign the next module.

REVIEW QUESTIONS CONFIRMATION KEY

1. The direct wave, ground reflected wave, and surface wave
2. 30 to 88 MHz
3. Half-wave formula; 468 divided by frequency in MHz
4. Horizontal and vertical
5. Counterpoise and ground radials
6. High take-off
7. Low take-off
8. Areas that radiation will pass through are called lobes, and the areas where no radiation exist are called nulls.
9. Bidirectional
10. Couplers allow many resonant antennas to be used over a broad range of frequencies.
11. The distance to your distant station(s) will dictate the propagation characteristics of the antenna system you choose.
12. Short range LOS
13. By adjusting the height of the antenna above the ground
14. By placing the antenna broadside to the distant station
15. By the low end of the antenna pointed 10 to 15 degrees right or left of the distant station
16. Near Vertical Incidence Sky-wave
17. Short range communications
18. Short range LOS and/or air-to-ground communications
19. These items absorb water and lose their insulating characteristics.
20. Trees, buildings, towers, and vehicles
21. A bad coupler
22. Ensure radio equipment is online, ensure connections are tight and free of corrosion, check or replace batteries, check that antenna elements are connected to the cobra head or balun properly, and check that antenna is pointed in the required direction
23. Radiation burns
24. Tripping, walking into things, falling objects, and stepping into holes
25. Post safety signs around antenna area

MODULE 2
ULTRA HIGH FREQUENCY/ULTRA HIGH FREQUENCY SATELLITE COMMUNICATIONS TACTICAL ANTENNAS

ABOUT THIS MODULE

This module introduces basic tactical communications using UHF/UFFH SATCOM tactical antennas. It provides information and briefly explains UHF/UHF SATCOM propagation, antenna fundamentals and siting, different antenna types, and building a field expedient antenna. It discusses safety and provides a brief introduction to troubleshooting.

OBJECTIVE(S)

- Explain UHF/UHF SATCOM propagation fundamentals.
- Explain UHF/UHF SATCOM antenna fundamentals.
- Explain siting UHF/UHF SATCOM antennas in a tactical environment.
- Discuss the different UHF/UHF SATCOM tactical antennas.
- Explain how to build a tactical UHF field expedient antenna.
- Explain basic troubleshooting on tactical antennas.
- Explain antenna safety.

TRAINING REFERENCE(S)

AT-1097 Manufacturer's Manual--Discone Antenna
DM C120 Technical Manual
AV-2040 Operator's Manual
DM C121 Technical Manual
DM C122 Technical Manual
DM C152 Technical Manual

UHF/UHF SATCOM PROPAGATION FUNDAMENTALS

UHF SPECTRUM

The UHF part of the military frequency spectrum is from 225 - 400 MHz. The best transmission path is via direct wave. The direct wave transmission path makes SATCOM, as well as LOS transmissions, possible.

DIRECT WAVE

Unlike HF propagation where the radio waves are refracted back to earth by the ionosphere, UHF radio waves pass through the ionosphere. This is due to their smaller (shorter) wavelength. The shorter wavelength also makes it less susceptible to solar disturbances (sunspots, solar flares, and ionospheric storms) and allows an UHF SATCOM antenna to be "aimed" at the distant station (satellite).

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1. Which communications path does UHF/UHF SATCOM radio waves take?

ANTENNA FUNDAMENTALS

Portable UHF transceivers are not high-powered stations. The normal UHF SATCOM transceiver is only capable of 25 watts. A UHF/FM transceiver (for LOS) is normally capable of only 5 to 20 watts. The antenna system must compensate for the low power by being very directional (narrow beamwidth such as used on UHF SATCOM antennas) and have high gain characteristics.

UHF ANTENNA POLARIZATION

UHF SATCOM antennas (the DM C12X family) have a circular polarization. This looks like a "corkscrew" with the transmit and receive wave twisting in opposite directions. This pattern produces a narrow beamwidth, normally only 10 degrees in width. This makes antenna siting important--an error of only 2 or 3 degrees is the difference between reliable and unreliable communications. Due to the narrow beamwidth, UHF SATCOM antennas are not very useful when trying to communicate with aircraft. UHF LOS antennas are normally horizontally polarized and omnidirectional.

ANTENNA GAIN

Due to their design characteristics, UHF SATCOM antennas have a higher gain than HF or UHF LOS antennas. A gain of 16 to 25 dB is not uncommon for a UHF SATCOM antenna.

2. *What is the polarization of UHF SATCOM antennas?*

3. *Why is it difficult to communicate with aircraft using UHF SATCOM antennas?*

SITING UHF/UHF SATCOM ANTENNAS IN A TACTICAL ENVIRONMENT

Site selection for UHF/UHF SATCOM antenna systems is relatively easy. Neither system requires a large area or special ground characteristics. The **important** thing to remember with UHF LOS antennas is the height of the antennas is paramount (the higher, the better). With UHF SATCOM antennas, there must be an unobstructed path towards the satellite. Most of the satellites used for UHF SATCOM operations are in a geosynchronous (stationary) orbit.

UHF LOS

As mentioned earlier, antenna height is the **greatest** factor in determining the effective range of UHF LOS communications. You can use all the power you want, but if the desired path of communications is blocked by a large building or the curvature of the earth, communications between stations will not exist. During site set-up, ensure that you place antennas as high as possible and that the support structures are sturdy. Also, place the transceiver as close as practical to the antenna to minimize signal loss from long coaxial cable runs.

UHF SATCOM

Establishing SATCOM, while not extremely difficult, is more involved than a LOS circuit. You need to know the uplink (your transmit frequency), downlink (your receive frequency), and the position of the satellite relative to your position. The area the satellite covers is known as the "footprint." The uplink, downlink, and satellite position is supplied to you, but it may be necessary for you to determine the required antenna azimuth and elevation of the antenna. To accomplish this task, you need an equatorial satellite pointing guide. The pointing guide is a

flat map of the earth with latitude, longitude, and satellite locations identified. A transparent overlay (which you center on the required satellite) allows you to locate your geographical location and read the required antenna azimuth and elevation. Once you have this data, you can site your antenna. Also, ensure the required transmission path is free of obstructions.

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4. What do radio operators use to determine azimuth and elevation for the required satellite?

UHF/UHF SATCOM ANTENNAS

Antenna selection for LOS or SATCOM operations is limited by the antenna types your unit is authorized. Normally, you have only one type for each application.

AT-1097

This is the most common UHF LOS antenna. It is omnidirectional and horizontally polarized. The antenna consists of two major parts--the active element and the reflector radials. Due to the small size of the antenna, it is easily constructed. The AT-1097 is used for ground-to-air and ground-to-ground operations.

DM C12X FAMILY

The DM C12X family of UHF SATCOM antennas includes the DM C120, C121, C122, and C152 models (see figures 2-1 through 2-4). The TRIVEC can be considered part of this family since it resembles a DM C120. The only difference is the TRIVEC uses element extensions to increase gain. UHF SATCOM antennas are designed primarily as the ground antenna link of a ground-to-SATCOM system. UHF SATCOM antennas are designed with high gain characteristics (needed for secure transmissions and satellite "footprint" fringe areas) and mobility (construction time is less than 3 minutes) in mind. The UHF SATCOM antennas are capable of LOS transmissions. However, they **should not** be used for LOS transmissions due to their narrow beamwidth and high gain characteristics. All antennas are circularly polarized.

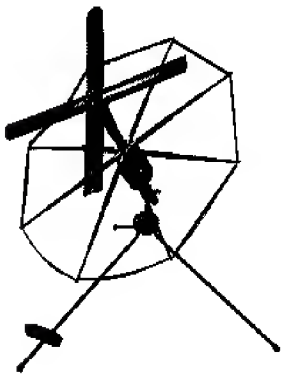

Figure 2-1. DM C120

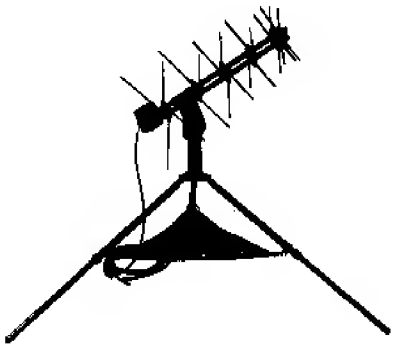

Figure 2-2. DM C121

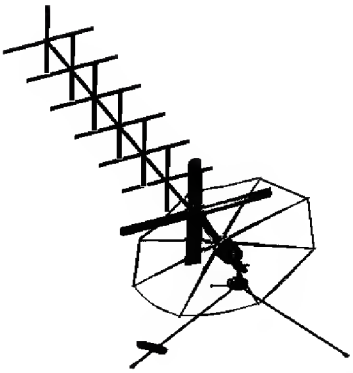

Figure 2-3. DM C122

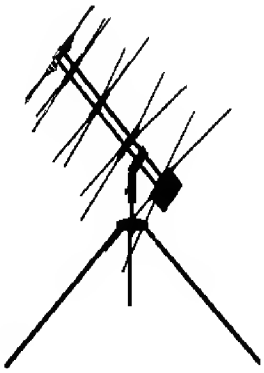

Figure 2-4. DM C152

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5. *What is the directivity of UHF SATCOM antennas?*

6. *What determines the gain of a TRIVEC antenna?*

TACTICAL UHF FIELD EXPEDIENT ANTENNA

UHF antennas are extremely difficult to engineer and construct using substitute materials. Minor variations in element lengths cause large amounts of reflected power, which makes them

potentially hazardous to your transceiver when keyed. Due to the risk of destroying a radio, construct receive only type antennas using TD-1 field wire and a non-conductive (wood or plastic) brace. The field wire is wrapped around the top of the brace, stretched tight, and wrapped around the bottom of the brace which causes it to bow slightly (it should resemble the bow from a bow and arrow set). Cut the length of the wire (from top to bottom of bow) as close as possible to the desired frequency using the half-wave or full-wavelength formula. There is no field expedient antenna for UHF SATCOM operations.

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7. Which types of materials are used to construct UHF field expedient antennas?

TROUBLESHOOTING

Unlike HF tactical antennas, troubleshooting UHF and UHF SATCOM antenna systems is straightforward. There are very few adjustments that you, the operator, can make. Once you are sure the antenna is pointed in the right direction and all the cables are connected, the only course of action you can take is to replace parts in your communications system (transceiver, coaxial cable, etc.) or the antenna system as a whole. If replacing parts of the system does not clear your problem, notify the appropriate maintenance section.

?

8. What actions can an operator take before notifying the appropriate maintenance section?

ANTENNA SAFETY

As discussed in module 1, antenna safety is paramount.

TRIPPING

Do not leave coaxial cables lying around. Either bury cables or run them through areas that receive the least amount of traffic. Identify all potential tripping hazards, such as cables, guy wires, and stakes with safety signs or flagging tape.

WALKING INTO OBJECTS

Identify all hazards above the ground that can be walked into (such as guy wires, poles, masts, elevated cables, and miscellaneous objects) with safety signs or flagging tape.

FALLING OBJECTS

When erecting the AT-1097, you normally construct an antenna mast. As discussed in module 1, when erecting a mast, use **"hard hats"** (or combat helmets), gloves, proper equipment, and adequate personnel. UHF SATCOM antennas are placed on the ground the majority of the time. On occasion, the antennas may be placed on a roof. In this case, ensure the antenna is "sandbagged" to prevent it from falling during bad weather. **Be alert at all times!**

STEPPING INTO HOLES

When holes are dug for poles that are later removed, promptly fill the holes or post safety signs. Also, upon arrival at a new deployment site, check the area for natural or manmade holes and fill all holes found.

RADIATION HAZARDS

With UHF SATCOM antennas, there is real danger of RF burns (due to the high gain and concentrated radiation beam). **NEVER TOUCH** or stand directly in front of the antennas. Mark areas with radiation hazards with fences, ropes, safety signs, or flagging tape.

Safety around antennas is a serious subject. Take all safety precautions while erecting and installing antennas. To prevent accidental contact with energized antennas, use safety signs or flagging tape once the antenna is constructed. Always be safety conscious when working on antennas.

9. How can you minimize radiation hazard contact?

10. How should areas with radiation hazards be marked?

SUMMARY

This module introduced you to basic tactical communications using UHF/UHF SATCOM tactical antennas. Full understanding can only be achieved through hands-on experience and additional study. Therefore, in your spare time research the training references located on the first page of this module.

ADDITIONAL INSTRUCTIONS

Compare your responses to the review questions with the confirmation key in the back of this module. Your responses do not have to match word-for-word, but should convey the same basic meaning. Review the applicable portions of this module for all missed questions. When ready, ask your trainer to administer the KEP questions for this module. This is a closed-book test, and you must score 70 percent or more. Your trainer will check your answers and review any incorrectly answered questions with you.

REVIEW QUESTIONS CONFIRMATION KEY

1. Direct wave/LOS
2. Right-hand circular
3. Because they have a narrow beamwidth (highly directional)
4. Satellite pointing guide and compass
5. Omnidirectional
6. The amount of extensions used
7. Non-conductive materials and wire
8. Ensure antenna is pointed in the right direction, ensure all cables are connected properly, and replace parts in your communication system
9. Stay clear of antennas
10. With safety signs or flagging tape

AIR FORCE QUALIFICATION TRAINING PACKAGE XXXXX-212N

PART OF AFJQS XXXXX-212N

TACTICAL ANTENNAS

Knowledge Evaluation Pamphlet

2 FEBRUARY 2000
SUPERSEDES AFJQS XXXXX-212N
DATED 1 OCTOBER 1999

FOR OJT USE ONLY

KNOWLEDGE EVALUATION PAMPHLET (KEP)

- This pamphlet should be separated from the package immediately and stored to prevent compromise of the questions. The answer sheet for the KEP is located at the back of this pamphlet. This answer sheet may be detached to make it easier to enter the answers. The KEP confirmation key, also located at the back of this pamphlet, should be detached and stored until ready for grading.
- After the trainee completes each module, the supervisor/trainer administers the corresponding KEP test. Using the KEP confirmation key, the supervisor/trainer checks the trainee's answers and reviews the incorrect responses. If the score is less than what is required, have the trainee restudy the module and retake the test.
- The trainee's responses to the KEP questions will aid us in evaluating the effectiveness of this training package. After the questions have been answered for all the module tests, please attach the completed and graded answer sheets to the training completion certification and send the package to us at the address specified.

KEP QUESTIONS - MODULE 1

1. What is the HF range?
   a. 3 to 30 MHz
   b. 3 to 300 kHz
   c. 30 to 300 MHz
   d. 3,000 kHz to 3,000 MHz

2. What are radio waves called that travel along or near the surface of the earth?

   a. Earth
   b. Global
   c. Ground
   d. Terrestrial

3. What makes sky-wave communications possible?

   a. The bending of radio waves by the ionosphere
   b. The receive antenna is properly oriented for an LOS shot
   c. The reflection of radio waves is greater than the refraction
   d. The transmitter power is equal to the transmitted frequency

4. What are the two different types of polarization?

   a. Ground and sky-wave
   b. Horizontal and vertical
   c. Diagonal and perpendicular
   d. Omnidirectional and directional

5. How are antennas classified?

   a. Resonant or nonresonant
   b. Transmit and receive
   c. Fixed or tactical
   d. Active or passive

6. Which device allows many resonant antennas to be used over a much broader range of frequencies without recutting the antenna?

   a. Balun
   b. Coupler
   c. Counterpoise
   d. Terminating resistor

7. Which type of polarized antenna works best for ground-wave circuits?

   a. Vertical
   b. Horizontal
   c. Bidirectional
   d. Omnidirectional

8. Why should the area you select be located reasonably close to the operations area?

   a. To allow quick mobility
   b. So less time is needed to set up
   c. To avoid excessively long coaxial cable runs
   d. So that the operator can fix the antenna (if needed) without getting into a vehicle

9. What will dictate the propagation characteristics of the antenna system you choose?

   a. The frequency range being used
   b. The terrain that has to be covered
   c. The distance to your distant stations
   d. The amount of power available, emission, and directivity

10. What is the most often used tactical wire antenna?

    a. Whip
    b. Long-wire
    c. Dipole/Doublet
    d. Near Vertical Incidence Sky-wave (NVIS)

11. Which type of antenna is made up of a vertical section and a horizontal section?

    a. Inverted "L"
    b. Folded Dipole
    c. Dipole/Doublet
    d. Sloping Long-wire

12. What is the radiation pattern of the Inverted Vee Antenna?

    a. Vertical
    b. Directional
    c. Bidirectional
    d. Omnidirectional

13. Which device is used to make a Sloping Long-wire antenna directional?

    a. Terminating resistor
    b. Counterpoise
    c. Coupler
    d. Balun

14. What is the polarization of the AS-2259 (NVIS) Antenna?

    a. Vertical
    b. Horizontal
    c. Omnidirectional
    d. Both horizontal and vertical

15. What is the purpose of an insulator?

    a. To change the directivity of the antenna being used
    b. To allow more than one antenna to be used at the same time
    c. To confine the electromagnetic waves to just the antenna
    d. To allow the antenna to operate over a wider range of frequencies

16. What is an example of a good antenna to improvise for long range communications?

a. Sloping Long-wire
b. Dipole/Doublet
c. Folded Dipole
d. Inverted Vee

17. What is most likely the problem with your antenna system if you are experiencing a problem with high reflected power at your radio set?

a. Radio problem
b. Balun problem
c. Coupler problem
d. Terminating resistor problem

18. An important point to consider when troubleshooting directional antennas is that the antenna

a. is directional.
b. is cut to the required frequency.
c. is pointed in the required direction.
d. will work over the required distance.

19. What should be done to all antennas once construction is complete?

a. Do a test of the antenna system
b. Take pictures for the unit historian
c. Post safety signs around antenna area
d. Determine if the antenna will work over the required distance

20. What is probably the most dangerous hazard when working with antennas?

a. Tripping
b. Falling objects
c. Touching antennas
d. Radiation hazards

KEP QUESTIONS - MODULE 2

1. What is the best transmission path for the UHF frequency spectrum?

   a. Sky wave
   b. Direct wave
   c. Point to point
   d. Long range path

2. What is the UHF part of the military frequency spectrum?

   a. 3 to 300 MHz
   b. 30 to 400 MHz
   c. 250 to 440 MHz
   d. 225 to 400 MHz

3. Which type of polarization looks like a "corkscrew" with the transmit and receive wave twisting in opposite directions?

   a. Circular
   b. Vertical
   c. Horizontal
   d. Omnidirectional

4. What is normally the radiation pattern of UHF LOS antennas?

   a. Directional
   b. Horizontally
   c. Bidirectional
   d. Omnidirectional

5. What is the greatest factor in determining the effective range of UHF LOS communications?

   a. The height of the antenna
   b. The use of repeater stations
   c. The amount of power available
   d. The direction the antenna is pointed

6. What is used to determine the required antenna azimuth and elevation of the antenna?

a. A compass
b. Satellite location document
c. Compass, road map, and antenna
d. Equatorial satellite pointing guide

7. What is the most common type of UHF LOS antenna?

a. Whip
b. AS-2259
c. AT-1097
d. DM C120

8. What is the only difference between the TRIVEC and the DM C120 Antennas?

a. The radiation pattern
b. The TRIVEC uses extensions.
c. The DM C120 uses extensions.
d. The TRIVEC has a wider frequency range.

9. Which type of field wire should be used to improvise UHF field expedient antennas?

a. TD-1
b. Telephone wire
c. Coaxial cable wire
d. Any type of wire will work.

10. Which type of field expedient antenna should be constructed for UHF SATCOM operations?

a. DM C120
b. DM C152
c. One that resembles the destroyed antenna
d. There is no field expedient antenna for UHF SATCOM.

11. What is the only course of action you can take after troubleshooting UHF and UHF SATCOM antennas?

a. Replace parts
b. Change frequencies
c. Change to HF communications
d. Notify appropriate maintenance section

12. What action is taken if replacing parts of the system has not cleared the problem?

a. Mute alarms
b. Change frequencies
c. Change to HF communications
d. Notify appropriate maintenance section

13. What should be done to UHF SATCOM antennas to prevent them from falling during bad weather?

a. Sandbag antenna base
b. Increase guy wire tension
c. Store antenna in a secure spot until weather clears.
d. Place the antenna on the ground until weather clears.

14. What action should be taken to prevent accidental contact with energized antennas?

a. Place the antennas as high as possible, so they can't be touched.
b. Remove power from antenna when not in use.
c. Post safety signs around the antenna area.
d. Site antennas away from operations area.

KEP CONFIRMATION KEY

MODULE 1	MODULE 2
1. a	1. b
2. c	2. d
3. a	3. a
4. b	4. d
5. a	5. a
6. b	6. d
7. a	7. c
8. c	8. b
9. c	9. a
10. c	10. d
11. a	11. a
12. d	12. d
13. a	13. a
14. d	14. c
15. c	
16. a	
17. c	
18. c	
19. c	
20. d	

KEP QUESTIONS ANSWER SHEET

NAME_____ RANK_____ DAFSC_____

ORGANIZATION_____ MAJCOM_____ DSN_____

AFJQS/AFQTP PUBLICATION DATE_____ DATE COMPLETED_____

MODULE 1	MODULE 2
1. ____	1. ____
2. ____	2. ____
3. ____	3. ____
4. ____	4. ____
5. ____	5. ____
6. ____	6. ____
7. ____	7. ____
8. ____	8. ____
9. ____	9. ____
10. ____	10. ____
11. ____	11. ____
12. ____	12. ____
13. ____	13. ____
14. ____	14. ____
15. ____	
16. ____	
17. ____	
18. ____	
19. ____	
20. ____	

NOTE: After completing and grading all tests, attach this answer sheet to the Training Completion Certification and send the package to the following address:

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